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2007−04

Processes

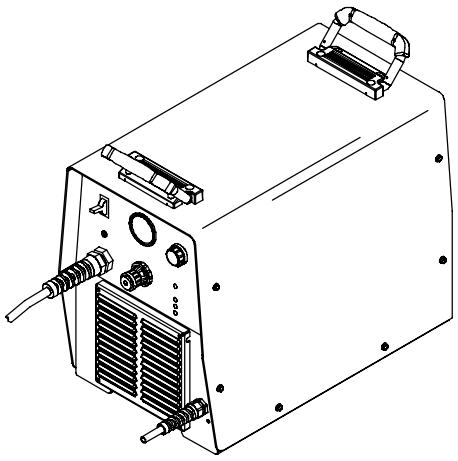
Air Plasma Cutting and Gouging

Description

Air Plasma Cutter

Spectrum® 625

And ICE-40C Torch



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www.MillerWelds.com

OWNER'S MANUAL

File: Plasma Cutters

From Miller to You

Thank you and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.

That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite. We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide the exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

ISO 9001:2000 REGISTERED QUALITY SYSTEM

Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001:2000 Quality System Standard.

Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual specification sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**

TRUE BLUE® WARRANTY

Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.

Miller®

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SECTION 1 − SAFETY PRECAUTIONS - READ BEFORE USING

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▲ **Warning: Protect yourself and others from injury — read and follow these precautions.**

1-1. Symbol Usage

Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ *Means "Note"; not safety related.*

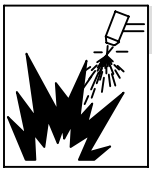
This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Plasma Arc Cutting Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-5. Read and follow all Safety Standards.**

▲ **Only qualified persons should install, operate, maintain, and repair this unit.**

▲ **During operation, keep everybody, especially children, away.**



CUTTING can cause fire or explosion.

Hot metal and sparks blow out from the cutting arc. The flying sparks and hot metal, hot workpiece, and hot equipment can cause fires and burns. Check and be sure the area is safe before doing any cutting.

- Remove all flammables within 35 ft (10.7 m) of the cutting arc. If this is not possible, tightly cover them with approved covers.
- Do not cut where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that sparks and hot materials from cutting can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that cutting on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not cut on closed containers such as tanks or drums.
- Connect work cable to the work as close to the cutting area as practical to prevent cutting current from traveling long, possibly unknown paths and causing electric shock, sparks, and fire hazards.
- Do not use plasma cutter to thaw frozen pipes.
- Never cut containers with potentially flammable materials inside − they must be emptied and properly cleaned first.
- Do not cut in atmospheres containing explosive dust or vapors.
- Do not cut pressurized cylinders, pipes, or vessels.
- Do not cut containers that have held combustibles.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Do not locate unit on or over combustible surfaces.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any cutting.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.

ELECTRIC SHOCK can kill.

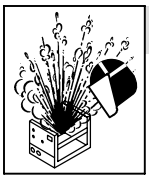
Touching live electrical parts can cause fatal shocks or severe burns. The torch and work circuit are electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. Plasma arc cutting requires higher voltages than welding to start and maintain the arc (200 to 400 volts dc are common), but also uses torches designed with safety interlock systems which turn off the machine when the shield cup is loosened or if tip touches electrode inside the nozzle. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not touch torch parts if in contact with the work or ground.
- Turn off power before checking, cleaning, or changing torch parts.
- Disconnect input power before installing or servicing this equipment. Lockout/tagout input power according to OSHA CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet − always verify the supply ground.
- When making input connections, attach proper grounding conductor first.
- Frequently inspect input power cord for damage or bare wiring − replace cord immediately if damaged − bare wiring can kill.
- Turn off all equipment when not in use.
- Inspect and replace any worn or damaged torch cable leads.
- Do not wrap torch cable around your body.
- Ground the workpiece to a good electrical (earth) ground if required by codes.
- Use only well-maintained equipment. Repair or replace damaged parts at once.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Do not bypass or try to defeat the safety interlock systems.
- Use only torch(es) specified in Owner's Manual.
- Keep away from torch tip and pilot arc when trigger is pressed.
- Clamp work cable with good metal-to-metal contact to workpiece (not piece that will fall away) or worktable as near the cut as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.

ELECTRIC SHOCK can kill.

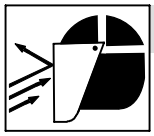
SIGNIFICANT DC VOLTAGE exists in inverter power sources AFTER the removal of input power.

- Turn Off unit, disconnect input power, check voltage on input capacitors, and be sure it is near zero (0) volts before touching any parts. Check capacitors according to instructions in Maintenance Section of Owner's Manual or Technical Manual before touching any parts.



EXPLODING PARTS can injure.

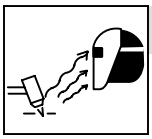
- On inverter power sources, failed parts can explode or cause other parts to explode when power is applied. Always wear a face shield and long sleeves when servicing inverters.



FLYING SPARKS can cause injury.

Sparks and hot metal blow out from the cutting arc. Chipping and grinding cause flying metal.

- Wear approved face shield or safety goggles with side shields.
- Wear proper body protection to protect skin.
- Wear flame-resistant ear plugs or ear muffs to prevent sparks from entering ears.



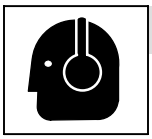
ARC RAYS can burn eyes and skin.

Arc rays from the cutting process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin.

- Wear face protection (helmet or shield) with a proper shade of filter lenses to protect your face and eyes when cutting or watching. ANSI Z49.1 (see Safety Standards) suggests a No. 9 shade (with No. 8 as minimum) for all cutting currents less than 300 amperes. Z49.1 adds that lighter filter shades may be used when the arc is hidden by the workpiece. As this is normally the case with low current cutting, the shades suggested in Table 1 are provided for the operator's convenience.
- Wear approved safety glasses with side shields under your helmet or shield.
- Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (leather, heavy cotton, or wool) and foot protection.

Table 1. Eye Protection For Plasma Arc Cutting

Current Level In Amperes			Minimum Shade Number
Below 20			#4
20 − 40			#5
40 − 60			#6
60 − 80			#8



NOISE can damage hearing.

Prolonged noise from some cutting applications can damage hearing if levels exceed limits specified by OSHA (see Safety Standards).

- Use approved ear plugs or ear muffs if noise level is high.
- Warn others nearby about noise hazard.

FUMES AND GASES can be hazardous.

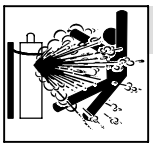
Cutting produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use local forced ventilation at the arc to remove cutting fumes and gases.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for metals to be cut, coatings, and cleaners.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Fumes from cutting and oxygen depletion can alter air quality causing injury or death. Be sure the breathing air is safe.
- Do not cut in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not cut on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the cutting area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes when cut.
- Do not cut containers with toxic or reactive materials inside or containers that have held toxic or reactive materials − they must be emptied and properly cleaned first.

PLASMA ARC can cause injury.

The heat from the plasma arc can cause serious burns. The force of the arc adds greatly to the burn hazard. The intensely hot and powerful arc can quickly cut through gloves and tissue.

- Keep away from the torch tip.
- Do not grip material near the cutting path.
- The pilot arc can cause burns − keep away from torch tip when trigger is pressed.
- Wear proper flame-retardant clothing covering all exposed body areas.
- Point torch away from your body and toward work when pressing the torch trigger − pilot arc comes on immediately.
- Turn off power source and disconnect input power before disassembling torch or changing torch parts.
- Use only torch(es) specified in the Owner's Manual.



CYLINDERS can explode if damaged.

Gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of metalworking processes, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flame, sparks, and arcs.
- Install and secure cylinders in an upright position by chaining them to a stationary support or equipment cylinder rack to prevent falling or tipping.
- Keep cylinders away from any cutting or other electrical circuits.
- Never allow electrical contact between a plasma arc torch and a cylinder.
- Never cut on a pressurized cylinder − explosion will result.
- Use only correct gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the right equipment, correct procedures, and sufficient number of persons to lift and move cylinders.
- Read and follow instructions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.

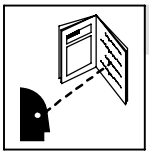
1-3. Additional Symbols For Installation, Operation, And Maintenance

HOT PARTS can cause severe burns.

- Do not touch hot parts bare handed.
- Allow cooling period before working on torch.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.

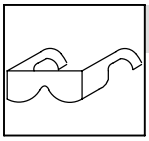
MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance as necessary.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before reconnecting input power.



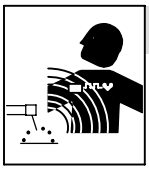
READ INSTRUCTIONS.

- Read Owner's Manual before using or servicing unit.
- Use only genuine Miller/Hobart replacement parts.



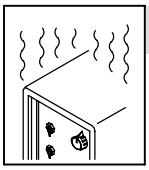
FLYING METAL can injure eyes.

- Wear safety glasses with side shields or face shield.



MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near plasma arc cutting operations.

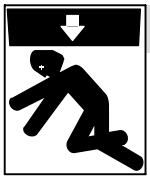


OVERUSE can cause OVERHEATING.

- Allow cooling period; follow rated duty cycle.
- Reduce amperage (thickness) or reduce duty cycle before starting to cut again.

EXPLODING HYDROGEN hazard.

- When cutting aluminum underwater or with the water touching the underside of the aluminum, free hydrogen gas may collect under the workpiece.
- See your cutting engineer and water table instructions for help.

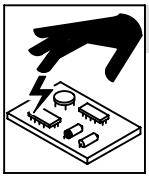


FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.

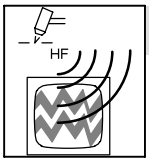
FIRE OR EXPLOSION hazard.

- Do not locate unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring − be sure power supply system is properly sized, rated, and protected to handle this unit.



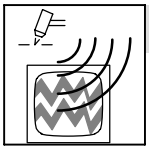
STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



H.F. RADIATION can cause interference.

- High frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



ARC CUTTING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- To reduce possible interference, keep cables as short as possible, close together, and down low, such as on the floor.
- Locate cutting operation 100 meters from any sensitive electronic equipment.
- Be sure this cutting power source is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the machine, using shielded cables, using line filters, or shielding the work area.

1-4. California Proposition 65 Warnings

▲ **Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)**

▲ **Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.**

For Gasoline Engines:

▲ **Engine exhaust contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.**

For Diesel Engines:

▲ **Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.**

1-5. Principal Safety Standards

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Recommended Practices for Plasma Arc Cutting, American Welding Society Standard AWS C5.2, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting And Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269−9101 (phone: 617−770−3000,website: www.nfpa.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250 (there are 10 Regional Offices−−phone for Region 5, Chicago, is 312−353−2220,website: www.osha.gov).

1-6. EMF Information

Considerations About Welding Or Cutting And The Effects Of Low Frequency Electric And Magnetic Fields

Welding or cutting current, as it flows through the welding or cutting cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: “The body of evidence, in the committee’s judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard.” However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep cutting power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the cut as possible.

About Pacemakers:

Pacemaker wearers consult your doctor before welding/cutting or going near welding/cutting operations. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 − CONSIGNES DE SÉCURITÉ − LIRE AVANT UTILISATION

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▲ **Avertissement : se protéger et protéger les autres contre le risque de blessure — lire et respecter ces consignes.**

2-1. Signification des symboles

Signifie Mise en garde ! Soyez vigilant ! Cette procédure présente des risques de danger ! Ceux-ci sont identifiés par des symboles adjacents aux directives.

▲ **Identifie un message de sécurité particulier.**

☞ *Signifie NOTA ; n'est pas relatif à la sécurité.*

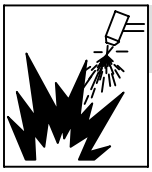
Ce groupe de symboles signifie Mise en garde ! Soyez vigilant ! Il y a des risques de danger reliés aux CHOCS ÉLECTRIQUES, aux PIÈCES EN MOUVEMENT et aux PIÈCES CHAUDES. Reportez-vous aux symboles et aux directives ci-dessous afin de connaître les mesures à prendre pour éviter tout danger.

2-2. Dangers liés au coupage à l'arc au plasma

▲ **Les symboles présentés ci-après sont utilisés tout au long du présent manuel pour attirer votre attention et identifier les risques de danger. Lorsque vous voyez un symbole, soyez vigilant et suivez les directives mentionnées afin d'éviter tout danger. Les consignes de sécurité présentées ci-après ne font que résumer l'information contenue dans les normes de sécurité énumérées à la section 2-4. Veuillez lire et respecter toutes ces normes de sécurité.**

▲ **L'installation, l'utilisation, l'entretien et les réparations ne doivent être confiés qu'à des personnes qualifiées.**

▲ **Au cours de l'utilisation, tenir toute personne à l'écart et plus particulièrement les enfants.**



LE COUPAGE présente un risque de feu ou d'explosion.

Des particules de métal chaud et des étincelles peuvent jaillir de la pièce au moment du coupage. Les étincelles et le métal chaud, la pièce à couper chauffée et l'équipement chaud peuvcnt causer un feu ou des brûlures. Avant de commencer à travailler, assurez-vous que l'endroit est sécuritaire.

- Déplacez toute matière inflammable se trouvant à l'intérieur d'un périmètre de 10,7 m (35 pi) de la pièce à couper. Si cela est impossible, vous devez les couvrir avec des housses approuvées et bien ajustées.
- Ne coupez pas dans un endroit où des étincelles pourraient atteindre des matières inflammables.
- Protégez−vous, ainsi que toute autre personne travaillant sur les lieux, contre les étincelles et le métal chaud.
- Assurez−vous qu'aucune étincelle ni particule de métal ne peut se glisser dans de petites fissures ou tomber dans d'autres pièces.
- Afin d'éliminer tout risque de feu, soyez vigilant et gardez toujours un extincteur à la portée de la main.
- Si vous coupez sur un plafond, un plancher ou une cloison, soyez conscient que cela peut entraîner un feu de l'autre côté.
- Ne coupez pas sur un contenant fermé tel qu'un réservoir ou un bidon.
- Fixez le câble de masse sur la pièce à couper, le plus près possible de la zone à couper afin de prévenir que le courant de coupage ne prenne une trajectoire inconnue ou longue et ne cause ainsi une décharge électrique, d'étincelles ou un feu.
- Ne pas utiliser le coupeur plasma pour dégeler des conduites gelées.
- Ne coupez jamais des contenants qui peuvent contenir des matières inflammables. Vous devez en premier lieu les vider et les nettoyer convenablement.
- Ne coupez pas dans un endroit où l'atmosphère risque de contenir de la poussière ou des vapeurs explosives.
- Ne coupez pas de bouteilles, de tuyaux ou de contenants pressurisés.
- Ne coupez pas de contenants qui ont déjà reçu des combustibles.
- Portez des vêtements de protection exempts d'huile tels que des gants en cuir, une veste résistante, des pantalons sans revers, des bottes et un casque.
- Ne placez pas le poste sur une surface combustible ou au−dessus de celle−ci.
- Avant le coupage, retirez tout combustible de vos poches, par exemple un briquet au butane ou des allumettes.
- Suivre les consignes de OSHA 1910.252 (a) (2) (iv) et de NFPA 51B pour travaux de soudage et prévoir un détecteur d'incendie et un extincteur à proximité.

UNE DÉCHARGE ÉLECTRIQUE peut entraîner la mort.

Le fait de toucher à une pièce électrique sous tension peut donner une décharge fatale ou entraîner des brûlures graves. Le chalumeau et le circuit de masse sont automatiquement actifs lorsque le poste est sous tension. L'alimentation d'entrée et les circuits internes de l'appareil le sont également. Le coupage au plasma d'arc exige des tensions plus élevées que le soudage pour amorcer et maintenir l'arc (souvent de 200 à 400 V CC), c'est pourquoi on fait appel à des chalumeaux conçus avec un système de verrouillage sécuritaire qui met l'appareil hors tension lorsque la capsule anti−feu est desserrée ou si le tube touche l'électrode à l'intérieur de la buse. Un poste incorrectement installé ou inadéquatement mis à la terre constitue un danger.

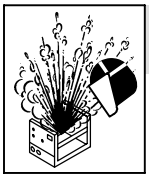
- Ne touchez pas aux pièces électriques sous tension.
- Portez des gants isolants et des vêtements de protection secs et sans trous.
- Isolez−vous de la pièce à couper et du sol en utilisant des housses ou des tapis assez grands afin d'éviter tout contact physique avec la pièce à couper ou le sol.
- Ne touchez pas aux pièces du chalumeau si vous êtes en contact avec la pièce à couper ou le sol.
- Mettez l'appareil hors tension avant d'effectuer la vérification, le nettoyage ou le changement d'une pièce du chalumeau.
- Coupez l'alimentation d'entrée avant d'installer l'appareil ou d'effectuer l'entretien. Verrouillez ou étiquetez la sortie d'alimentation selon la norme OSHA 29 CFR 1910.147 (reportez−vous aux Principales normes de sécurité).
- Installez le poste correctement et mettez-le à la terre convenablement selon les consignes du manuel de l'opérateur et les normes nationales, provinciales et locales.
- Assurez−vous que le fil de terre du cordon d'alimentation est correctement relié à la borne de terre dans la boîte de coupure ou que la fiche du cordon est branchée à une prise correctement mise à la terre − vous devez toujours vérifier la mise à la terre.
- Avant d'effectuer les connexions d'alimentation, vous devez relier le bon fil de terre.
- Vérifiez fréquemment le cordon d'alimentation afin de vous assurer qu'il n'est pas altéré ou à nu, remplacez−le immédiatement s'il l'est. Un fil à nu peut entraîner la mort.
- L'équipement doit être hors tension lorsqu'il n'est pas utilisé.
- Vérifiez et remplacez les cosses du câble du chalumeau si elles sont usées ou altérées.
- Le câble du chalumeau ne doit pas s'enrouler autour de votre corps.
- Si les normes le stipulent, la pièce à couper doit être mise à la terre.
- Utilisez uniquement de l'équipement en bonne condition. Réparez ou remplacez immédiatement toute pièce altérée.
- Portez un harnais de sécurité si vous devez travailler au−dessus du sol.
- Assurez−vous que tous les panneaux et couvercles sont correctement en place.
- N'essayez pas d'aller à l'encontre des systèmes de verrrouillage de sécurité ou de les contourner.
- Utilisez uniquement le ou les chalumeaux recommandés dans le manuel de l'opérateur.

- N’approchez pas le tube du chalumeau et l’arc pilote lorsque la gâchette est enfoncée.
- Le câble de masse doit être pincé correctement sur la pièce à couper, métal contre métal (et non de telle sorte qu’il puisse se détacher), ou sur la table de travail le plus près possible de la ligne de coupage.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.

DÉCHARGES ÉLECTRIQUES potentiellement mortelles.

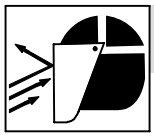
Il y a DES CHARGES DC SIGNIFICATIVES dans le poste de soudage inverseur même APRÈS coupure du courant d’alimentation.

- Mettre l’unité hors tension, mesurer la tension des condensateurs d’entrée et s’assurer qu’elle est pratiquement nulle avant de toucher à l’une quelconque des pièces. Mesurer cette tension conformément aux directives énoncées à la section Entretien du manuel de l’utilisateur ou du manuel technique avant de toucher à l’une quelconque des pièces.



Risque de blessure en cas D’EXPLOSION DES PIÈCES.

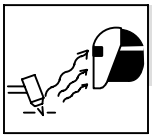
- Mise sous tension, toute pièce défectueuse des sources d’alimentation de l’inverseur peut exploser ou faire exploser d’autres pièces. Pour entretenir les inverseurs, toujours porter un masque protecteur et un vêtement à manches longues.



LES ÉTINCELLES VOLANTES risquent de provoquer des blessures.

Le coupage plasma produit des étincelles et projections de métal à très haute température. Lorsque la pièce refroidit, du laitier peut se former.

- Portez une visière ou des lunettes de sécurité avec des écrans latéraux approuvées.
- Portez des vêtements de protection adéquats afin de protéger votre peau.
- Ayez recours à des protège−tympans ou à un serre−tête ignifuges afin d’éviter que les étincelles n’entrent dans vos oreilles.



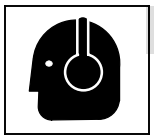
LES RAYONS D’ARC peuvent entraîner des brûlures aux yeux et à la peau.

Les rayons d’arc provenant du procédé de coupage produisent des rayons visibles et invisibles intenses (ultraviolets et infrarouges) qui peuvent entraîner des brûlures aux yeux et à la peau.

- Lorsque vous coupez ou regardez quelqu’un couper, portez un casque de soudage approuvé muni de verres filtrants approprié. La norme ANSI Z49.1 (reportez−vous aux Principales normes de sécurité) suggère d’utiliser un filtre de teinte n○ 9 (n○ 8 étant le minimum) pour tout travail de coupage faisant appel à un courant de moins de 300 A. On mentionne également dans la norme Z49.1 qu’un filtre plus faible peut être utilisé lorsque l’arc est caché par la pièce à couper. Comme cela est habituellement le cas pour les travaux de coupage à faible courant, les teintes énumérées au tableau 1 sont fournies à titre d’information pour l’opérateur.
- Porter des lunettes de sécurité à coques latérales sous votre casque ou écran facial.
- Ayez recours à des écrans protecteurs ou à des rideaux pour protéger les autres contre les rayonnements, les étincelles et les éblouissements; prévenez toute personne sur les lieux de ne pas regarder l’arc.
- Portez des vêtements confectionnés avec des matières résistantes et ignifuges (cuir, coton lourd ou laine) et des bottes de protection.

Tableau 1. Protection des yeux pour le coupage au plasma d’arc

Intensité de courant en ampères			Filtre de teinte (minimum)
Moins de 20			no. 4
20 − 40			no. 5
40 − 60			no. 6
60 − 80			no. 8



LE BRUIT peut endommager l’ouïe.

Certaines applications de coupage produisent un bruit constant, ce qui peut endommager l’ouïe si le niveau sonore dépasse les limites permises par l’OSHA (reportez−vous aux Principales normes de sécurité).

- Utilisez des protège−tympans ou un serre−tête antibruit si le niveau sonore est élevé.
- Prévenez toute personne sur les lieux du danger relié au bruit.

LES FUMÉES ET LES GAZ peuvent être dangereux.

Le coupage produit des vapeurs et des gaz. Respirer ces vapeurs et ces gaz peut être dangereux pour la santé.

- Ne mettez pas votre tête au−dessus des vapeurs. Ne respirez pas ces vapeurs.
- Si vous êtes à l’intérieur au moment du coupage, ventilez la pièce ou ayez recours à une ventilation aspirante installée près de l’arc pour évacuer les vapeurs et les gaz.
- Si la ventilation est médiocre, utilisez un respirateur anti−vapeurs approuvé.
- Lire et comprendre les spécifications de sécurité des matériaux (MSDS) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
- Travaillez dans un espace restreint uniquement s’il est bien ventilé ou si vous portez un respirateur anti−vapeurs. Les vapeurs causées par le coupage et l’épuisement de l’oxygène peuvent altérer la qualité de l’air et entraîner des blessures ou la mort. Assurez−vous que l’air ambiant est sain pour la santé.
- Ne coupez pas dans un endroit près d’opérations de décapage, de nettoyage ou de vaporisation. La chaleur et les rayons d’arc peuvent réagir avec les vapeurs et former des gaz hautement toxiques et irritants.
- Ne coupez pas des métaux enrobés tels que des métaux galvanisés, contenant du plomb ou de l’acier plaqué au cadmium, à moins que l’enrobage ne soit ôté de la surface du métal à couper, que l’endroit où vous travaillez ne soit bien ventilé, ou que vous ne portiez un respirateur anti−vapeurs. Les enrobages ou tous métaux qui contiennent ces éléments peuvent créer des vapeurs toxiques s’ils sont coupés.
- Ne coupez pas de contenants qui renferment ou ont renfermés des matières toxiques ou réactives − vous devez en premier lieu les vider et les nettoyer convenablement.

LE PLASMA D’ARC peut entraîner des blessures.

La chaleur dégagée par le plasma d’arc peut entraîner de sérieuses brûlures. La force de l’arc est un facteur qui s’ajoute au danger de brûlures. La chaleur intense et la puissance de l’arc peuvent rapidement passer au travers de gants et de tissus.

- N’approchez pas le tube du chalumeau.
- Ne saisissez pas la pièce à couper près de la ligne de coupage.
- L’arc pilote peut causer des brûlures − n’approchez pas le tube du chalumeau lorsque vous avez appuyé sur le gâchette.
- Portez des vêtements de protection adéquats qui recouvrent tout votre corps.
- Ne pointez pas le chalumeau en direction de votre corps ni de la pièce à couper lorsque vous appuyez sur la gâchette − l’arc pilote s’allume automatiquement.
- Mettez l’alimentation hors tension et débranchez le cordon d’alimentation avant de démonter le chalumeau ou de changer une pièce du chalumeau.
- Utilisez uniquement le ou les chalumeaux recommandés dans le manuel de l’opérateur.

LES BOUTEILLES peuvent exploser si elles sont endommagées.

Les bouteilles de gaz contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Puisque les bouteilles de gaz font habituellement partie d’un processus de travail des métaux, assurez−vous de les manipuler correctement.

- Protégez les bouteilles de gaz comprimé contre la chaleur excessive, les chocs mécaniques, des dommages physiques, le laitier, la flamme, les étincelles et l’arc.
- Installez et attachez les bouteilles dans la position verticale à l’aide d’une chaîne, sur un support stationnaire ou un châssis porte−bouteille afin de prévenir qu’elles ne tombent ou ne basculent.

- Les bouteilles ne doivent pas être près de la zone de coupage ni de tout autre circuit électrique.
- Un contact électrique ne doit jamais se produire entre un chalumeau de plasma d'arc et une bouteille.
- Ne coupez jamais sur une bouteille pressurisée − une explosion en résulterait.
- Utilisez uniquement des bouteilles de gaz, des détendeurs, des boyaux et des raccords conçus pour l'application déterminée. Gardez−les, ainsi que toute autre pièce associée, en bonne condition.
- Détournez votre visage du détendeur−régulateur lorsque vous ouvrez la soupape de la bouteille.
- Le couvercle du détendeur doit toujours être en place, sauf lorsque vous utilisez la bouteille ou qu'elle est reliée pour usage ultérieur.
- Utiliser les équipements corrects, les bonnes procédures et suffisamment de personnes pour soulever et déplacer les bouteilles.
- Lire et suivre les instructions sur les bouteilles de gaz comprimé, l'équipement connexe et le dépliant P-1 de la CGA (Compressed Gas Association) mentionné dans les principales normes de sécurité.

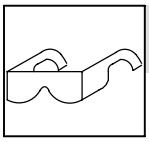
2-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance

DES PIECES CHAUDES peuvent provoquer des brûlures graves.

- Ne pas toucher des parties chaudes à mains nues.
- Laisser refroidir avant d'intervenir sur la torche.
- Ne pas toucher aux pièces chaudes, utiliser les outils recommandés et porter des gants de soudage et des vêtements épais pour éviter les brûlures.

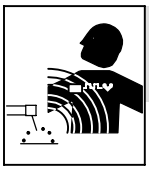
DES ORGANES MOBILES peuvent provoquer des blessures.

- S'abstenir de toucher des organes mobiles tels que des ventilateurs.
- Maintenir fermés et verrouillés les portes, panneaux, recouvrements et dispositifs de protection.
- Seules des personnes qualifiées sont autorisées à enlever les portes, panneaux, recouvrements ou dispositifs de protection pour l'entretien.
- Remettre les portes, panneaux, recouvrements ou dispositifs de protection quand l'entretien est terminé et avant de rebrancher l'alimentation électrique.



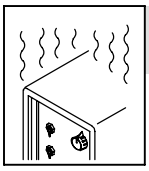
DES PARTICULES VOLANTES peuvent blesser les yeux.

- Porter des lunettes de sécurité avec protections latérales ou frontales.



LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs sont priés de consulter leur médecin avant d'approcher les opérations de coupage plasma.



L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Prévoir une période de refroidissement; respecter le cycle opératoire nominal.
- Réduire l'ampérage (épaisseur) avant de continuer à couper ou réduire le facteur de marche.

Danger D'EXPLOSION D'HYDROGÈNE.

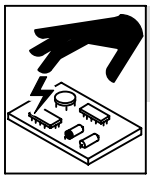
- Lors du coupage d'aluminium partiellement ou totalement immergé dans l'eau, de l'hydrogène libre peut s'accumuler sous la pièce.
- Consultez votre ingénieur de coupage et les instructions de la table de coupage.

LA CHUTE DE L'APPAREIL peut blesser.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil, NON PAS les chariot, les bouteilles de gaz ou tout autre accessoire.
- Utiliser un engin d'une capacité appropriée pour soulever l'appareil.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.

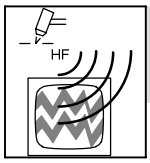
Risque D'INCENDIE OU D'EXPLOSION.

- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces infllammables.
- Ne pas installer l'appareil à proximité de produits inflammables
- Ne pas surcharger l'installation électrique − s'assurer que l'alimentation est correctement dimensionné et protégé avant de mettre l'appareil en service.



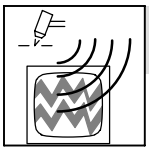
LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Etablir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes PC.



LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.

- Le Rayonnement haute frequence (H.F.) peut provoquer des interférences avec les équipements de radio−navigation et de communication, les services de sécurité et les ordinateurs.
- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.
- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence, maintenir les éclateurs à une distance correcte et utiliser une terre et et un blindage pour réduire les interférences éventuelles.



LE COUPAGE Ã L'ARC peut causer des interférence.

- L'énergie électromagnétique peut gêner le fonctionnement d'appareils électroniques comme des ordinateurs et des robots.
- Pour réduire la possibilité d'interférence, maintenir les câbles aussi courts que possible, les grouper, et les poser aussi bas que possible (ex. par terre).
- Veiller à couper à une distance de 100 mètres de tout équipement électronique sensible.
- S'assurer que la source de coupage est correctement branchée et mise à la terre.
- Si l'interférence persiste, l'utilisateur doit prendre des mesures supplémentaires comme écarter la machine, utiliser des câbles blindés de des filtres, ou boucler la zone de travail.

2-4. Principales normes de sécurité

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, de Global Engineering Documents (téléphone : 1-877-413-5184, site Internet : www.global.ihs.com).

Recommended Practices for Plasma Arc Cutting, American Welding Society Standard AWS C5.2, de Global Engineering Documents (téléphone : 1-877-413-5184, site Internet : www.global.ihs.com).

Recommended Safe Practice for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, norme AWS F4.1, de l'American Welding Society de Global Engineering Documents (téléphone : 1-877-413-5184, site Internet : www.global.ihs.com).

National Electrical Code, NFPA Standard 70, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, de la Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Règles de sécurité en soudage, coupage et procédés connexes, norme CSA W117.2, de l'Association canadienne de normalisation, vente de normes, 178 Rexdale Boulevard, Rexdale (Ontario) Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, norme ANSI Z87.1, de l'American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting and Welding Processes, norme NFPA 51B, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, de National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (téléphone : 617-770-3000, site Internet : www.nfpa.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, de U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250 (il y a 10 bureaux régionaux−−le téléphone de la région 5, Chicago, est 312-353-2220, site Internet : www.osha.gov).

2-5. Information sur les champs électromagnétiques

Données sur le soudage électrique et sur les effets, pour l'organisme, des champs magnétiques basse fréquence

Le courant de soudage ou de coupage passant dans les câbles de puissance crée des causera des champs électromagnétiques. Il y a eu et il y a encore un certain souci à propos de tels champs. Cependant, après avoir examiné plus de 500 études qui ont été faites pendant une période de recherche de 17 ans, un comité spécial ruban bleu du National Research Council a conclu: "L'accumulation de preuves, suivant le jugement du comité, n'a pas démontré que l'exposition aux champs magnétiques et champs électriques à haute fréquence représente un risque à la santé humaine". Toutefois, des études sont toujours en cours et les preuves continuent à être examinées. En attendant que les conclusions finales de la recherche soient établies, il vous serait souhaitable de réduire votre exposition aux champs électromagnétiques pendant le soudage ou le coupage.

Afin de réduire les champs électromagnétiques dans l'environnement de travail, respecter les consignes suivantes :

1 Garder les câbles ensembles en les torsadant ou en les attachant avec du ruban adhésif.

2 Mettre tous les câbles du côté opposé de l'opérateur.

3 Ne pas courber pas et ne pas entourer pas les câbles autour de vous.

4 Garder le poste de soudage et les câbles le plus loin possible de vous.

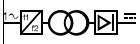
5 Relier la pince de masse le plus près possible de la zone de soudure.

Consignes relatives aux stimulateurs cardiaques :

Les porteurs de stimulateur cardiaque doivent consulter leur médecin avant de souder/couper ou d'approcher des opérations de soudage/couper. Si le médecin approuve, il est recommandé de suivre les procédures précédentes.

SECTION 3 − DEFINITIONS

3-1. Symbols And Definitions For Nameplate And Serial Number/Rating Label

A	Amperes		Plasma Arc Cutting (PAC)		Adjust Air/Gas Pressure		Low Air Pressure Light
V	Volts		Increase		No − Do Not Do This		Temperature
	Protective Earth (Ground)		Single Phase		Constant Current		Voltage Input
I	On		Off	%	Percent		Direct Current
U_0	Rated No Load Voltage (Average)	U_1	Primary Voltage	U_2	Conventional Load Voltage		Line Connection
I_{1max}	Rated Maximum Supply Current	I_2	Rated Welding Current	X	Duty Cycle		Single Phase Static Frequency Converter-Transformer-Rectifier
IP	Degree Of Protection		Loose Shield Cup		Input	Hz	Hertz
I_{1eff}	Maximum Effective Supply Current	pf	power factor	S	Suitable for Some Hazardous Locations	S_1	Power Rating, Product Of Voltage And Current (KVA)

SECTION 4 − INSTALLATION

4-1. Specifications

50/60 Hz	Amperes Input at Rated Load Output 50/60 Hz				Rated Output	Type of Output	Plasma Gas	Flow/ Pressure	Rated Cutting Capacity	Maximum Open-Circuit Voltage DC
	208 V	230 V	KVA	KW						
Single-Phase	33	30	6.8	6.7	40 A @ 140 Volts DC, 50% Duty Cycle	Direct Current, Straight Polarity (DCEN)	Air Or Nitrogen Only	6 CFM (170 L/min) at 75 PSI (517 kPa)	0.5 in (12.7 mm) At 16 IPM	260

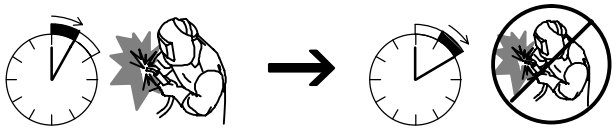
4-2. Specifications For Torch

Air-cooled torch for plasma arc cutting (PAC)
50% duty cycle
Safety interlock devices disable power source
Safety trigger guard
Cutting capacity: see Section 4-1

4-3. Duty Cycle And Overheating

For Units Connected to a 208 Volt Circuit or a 230 Volt Circuit:

50% Duty Cycle At 40 amperes, 140 volts dc (typical cutting)



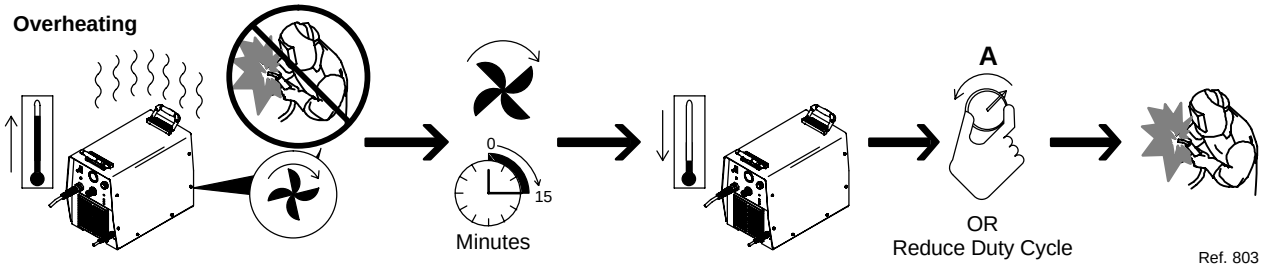
5 Minutes Cutting — 5 Minutes Resting

Duty Cycle is percentage of 10 minutes that unit can cut at rated load without overheating.

If unit overheats, output stops, temperature status light illuminates, and cooling fan runs. Wait fifteen minutes for unit to cool or temperature light to go off. Reduce amperage or duty cycle before cutting or gouging.

▲ **Exceeding duty cycle can damage unit and void warranty.**

Overheating

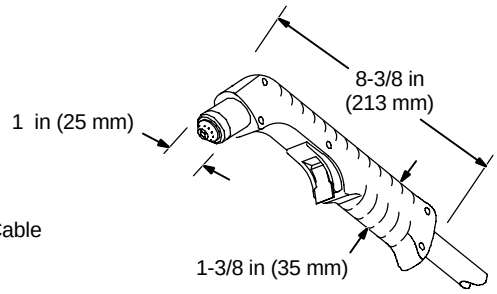


Minutes

OR
Reduce Duty Cycle

Ref. 803 219

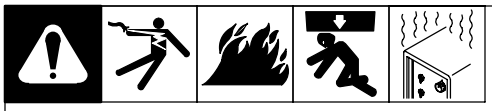
4-4. Torch Dimensions And Weight



3.5 lb (1.6 kg) With 25 ft (7.6 m) Cable

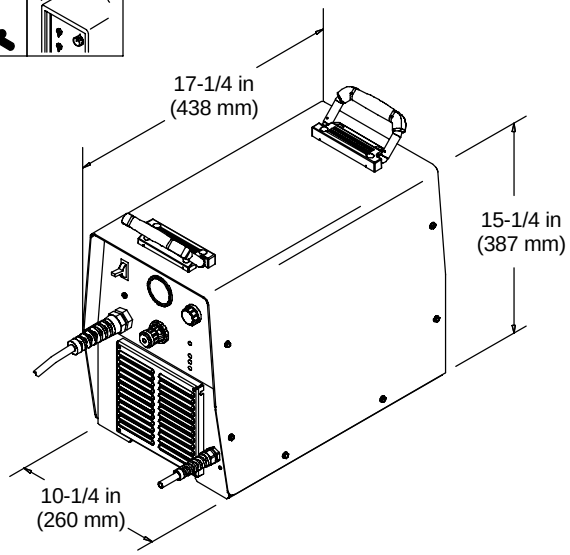
Ref. 801 397-A

4-5. Unit Dimensions, Weight, And Movement



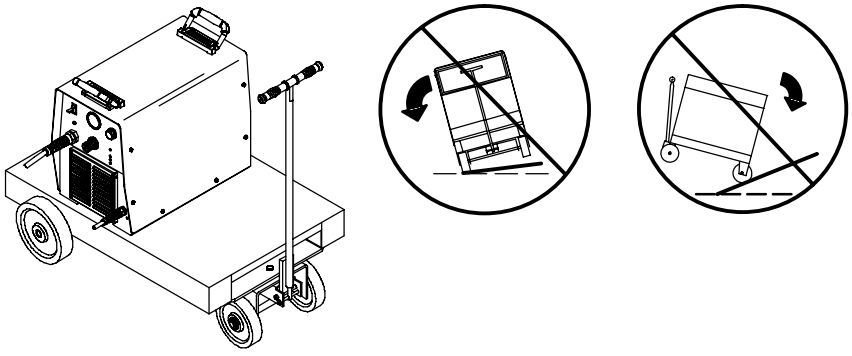
Dimensions And Weight

57 lb (25.9 kg)



Movement

▲ **Do not move or operate unit where it could tip.**



1 Lifting Handles

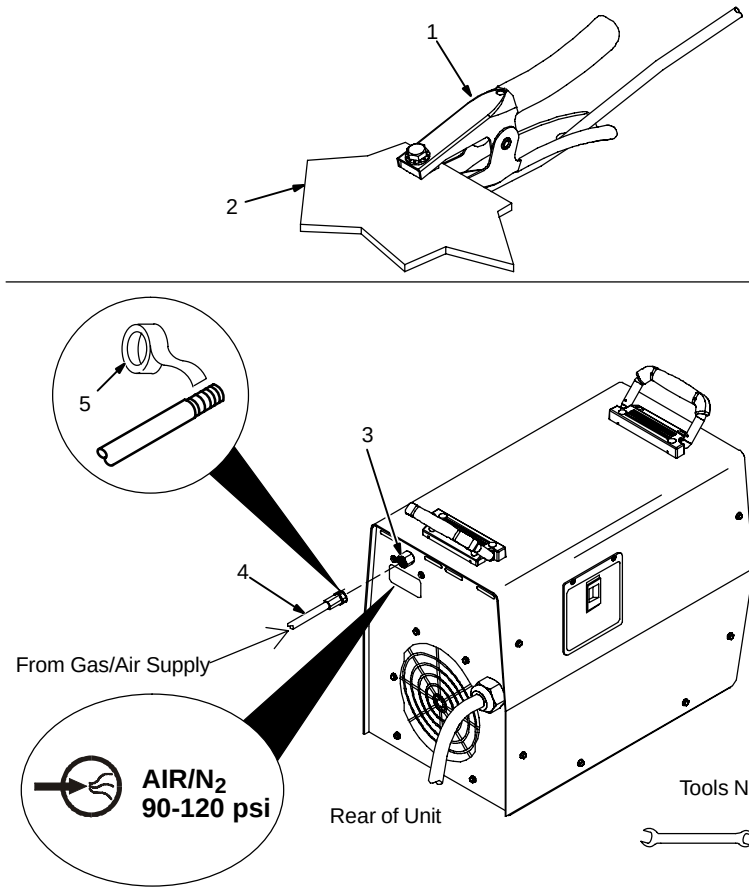
Use handles to lift unit.

2 Hand Cart

Use cart or similar device to move unit.

loc_2 3/96 - Ref. 803 219 / 803 220

4-6. Connecting Work Clamp and Gas/Air Supply



1 Work Clamp

2 Workpiece

Connect work clamp to a clean, paint-free location on workpiece, as close to cutting area as possible.

☞ *Use only clean, dry air with 90 to 120 psi (621 to 827 kPa) pressure. Prevent moisture from entering air supply at extreme cold temperatures.*

3 Gas/Air Inlet Opening

4 Hose

☞ *Hose must have a minimum inside diameter of 3/8 in (9.5 mm).*

5 Teflon Tape

Obtain hose with 1/4 NPT right-hand thread fitting. Wrap threads with teflon tape (optional) or apply pipe sealant, and install fitting in opening. Route hose to gas/air supply.

Or

Install supplied quick connect male 1/4 in NPT pipe fitting.

Connect female quick connect fitting to pipe fitting.

Route hose to gas/air supply.

▲ **Incorrect plasma gas can cause torch and power source damage. Use only air or nitrogen for the plasma gas.**

Ref. 803 640-A / 803 221

4-7. Electrical Service Guide

	50/60 Hz Single Phase	
Input Voltage	208	230
Input Amperes At Rated Output	33	30
Max Recommended Standard Fuse Rating In Amperes		
Cricuit Breaker [1], Time-Delay [2]	40	35
Normal Operating [3]	50	45
Min Input Conductor Size In AWG [4]	10	10
Max Recommended Input Conductor Length In Feet (Meters)	80 (24)	98 (30)
Min Grounding Conductor Size In AWG [4]	10	10

Reference: 2005 National Electrical Code (NEC) (including article 630)

1 Choose a circuit breaker with time-current curves comparable to a Time Delay Fuse.

2 “Time-Delay” fuses are UL class “RK5” .

3 “Normal Operating” (general purpose - no intentional delay) fuses are UL class “K5” (up to and including 60 amp), and UL class “H” (65 amp and above).

4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.16. If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.

▲ **Caution: Failure to follow these fuse and circuit breaker recommendations could create an electric shock or fire hazard.**

4-8. Extension Cord Data

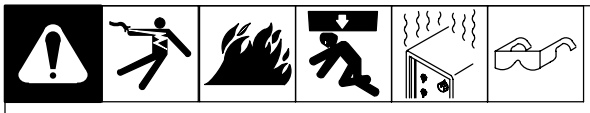
NOTE ☞ *When calculating max. cord length, remember to include conductor length from line disconnect device to input power receptacle.*

Input Voltage	Input Power Phase	Hertz	Fuse Size Or Circuit Breaker Rating		Conductor Size	Max. Cord Length
208 V	1	50/60	**Time-Delay [2]** **Normal Operating [3]**	40 A 50 A	10 AWG	80 ft (24 m)
230 V	1	50/60	**Time-Delay [2]** **Normal Operating [3]**	35 A 45 A	10 AWG	98 ft (30 m)

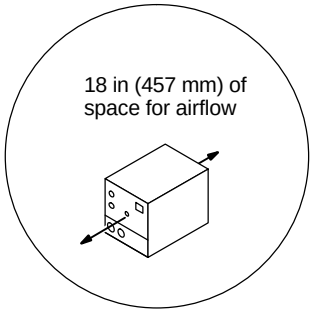
2 “Time-Delay” fuses are UL class “RK5” .

3 “Normal Operating” (general purpose − no intentional delay) fuses are UL class “K5” (up to and including 60 amp), and UL class “H” (65 amp and above).

4-9. Selecting A Location And Connecting Input Power

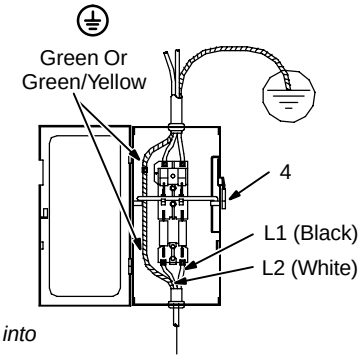


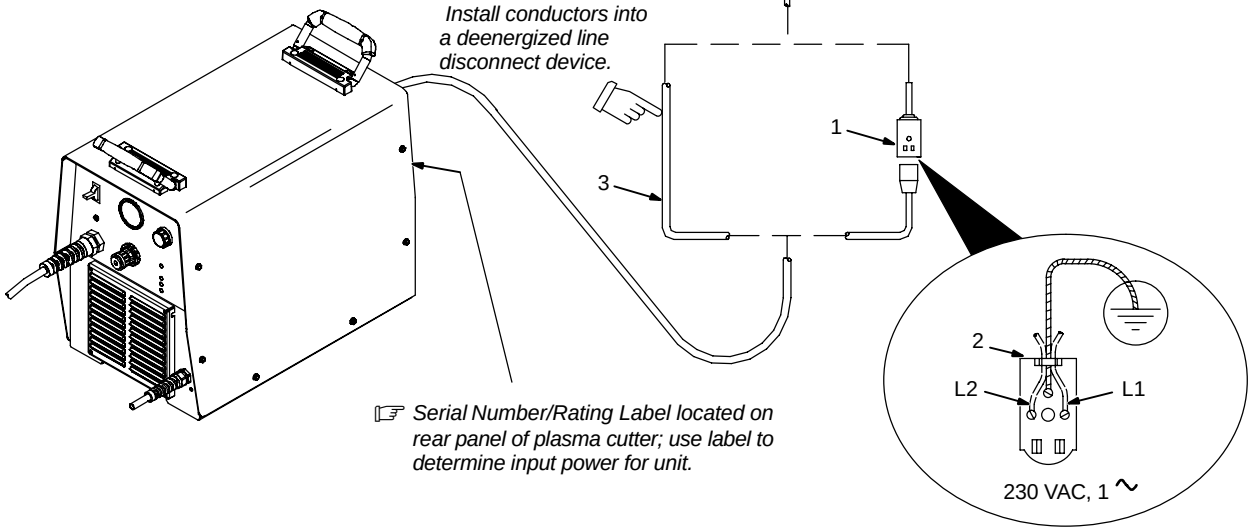
▲ **Do not move or operate unit where it could tip.**



⏚ = GND/PE

▲ **Always connect grounding conductor first.**





☞ *Serial Number/Rating Label located on rear panel of plasma cutter; use label to determine input power for unit.*

1 Plug (NEMA Type 6-50P)

2 Receptacle (NEMA Type 6-50R)

Connect plug to receptacle.

3 Input And Grounding Conductors

For single-phase operation:

▲ **Make input power connections to the machine before making connections into a deenergized line disconnect device. In the line disconnect device, always connect green or green/yellow grounding conductor to supply grounding terminal first, never to a line terminal.**

Connect directly to line disconnect device if hard wiring is required.

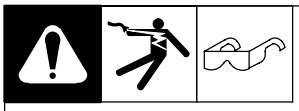
4 Line Disconnect Device

See Section 4-7.

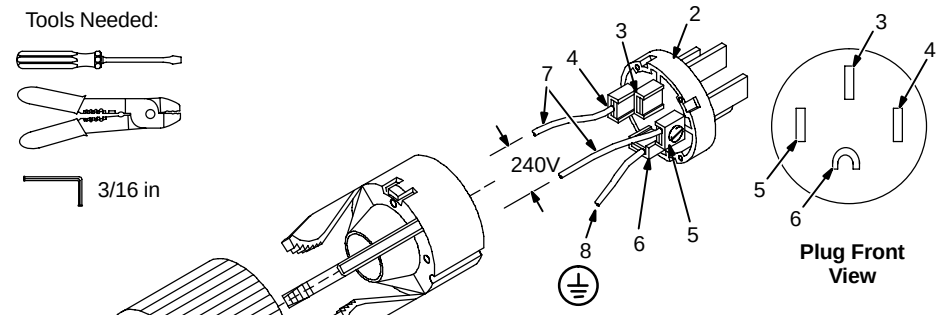
▲ **Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.**

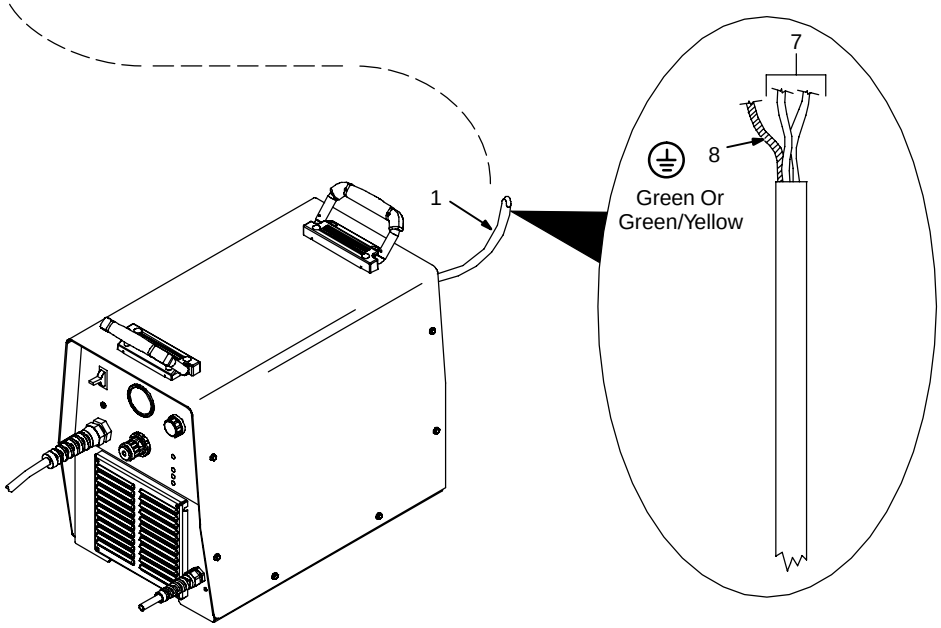
208 959 / 803 222

4-10. Wiring Optional 240 Volt Plug (119 172) For Connection To Bobcat, Trailblazer Or Champion 10,000



Tools Needed:





1 Input And Grounding Conductors

2 Plug Wired for 240 V, 2-Wire Load

3 Neutral (Brass) Terminal And Prong **(Not Used)**

4 Load 1 (Brass)Terminal And Prong

5 Load 2 (Brass) Terminal And Prong

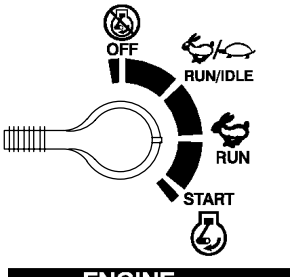
6 Ground (Brass) Terminal And Prong

7 Black And White Input Conductors

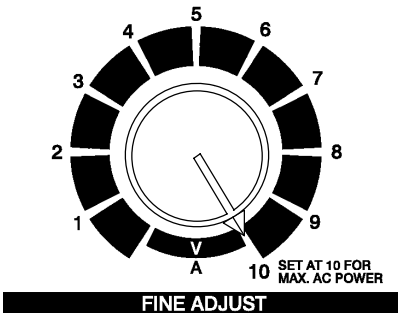
8 Green Or Green/Yellow Ground Conductor

▲ **Always connect green or green/yellow wire to ground terminal, never to a load terminal. Connect black (L1) and white (L2) wires to load terminals.**

▲ **Engine Control Switch must be set at "RUN" position − not "RUN/IDLE".**



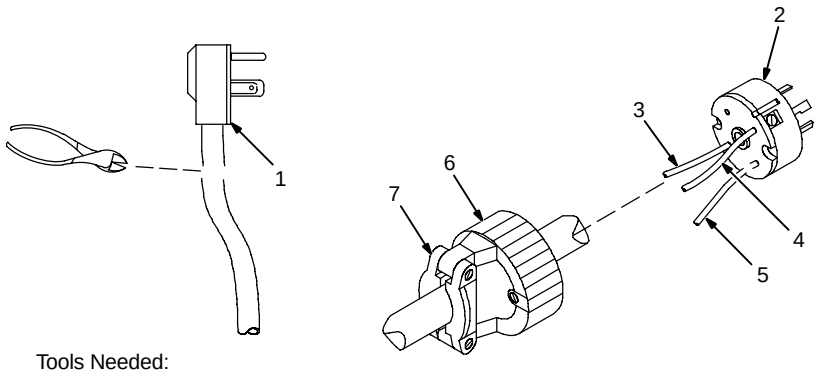
▲ **Set generator Fine Adjustment Control to 10 for maximum auxiliary power, if applicable.**



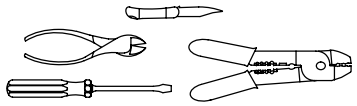
Ref. 120 813-D / Ref. 803 222

4-11. Installing Alternative Plug

This procedure is necessary if the unit is to be connected to a 208/230 VAC receptacle that requires a plug that is different from the supplied plug.



Tools Needed:



1 Supplied 230 VAC Plug

Cut cord close to plug.

2 Alternative Plug (230 VAC Plug Shown)

3 Input (Black Lead) (Brass) Terminal

4 Input (White Lead) (Brass) Terminal

5 Ground (Green) Terminal

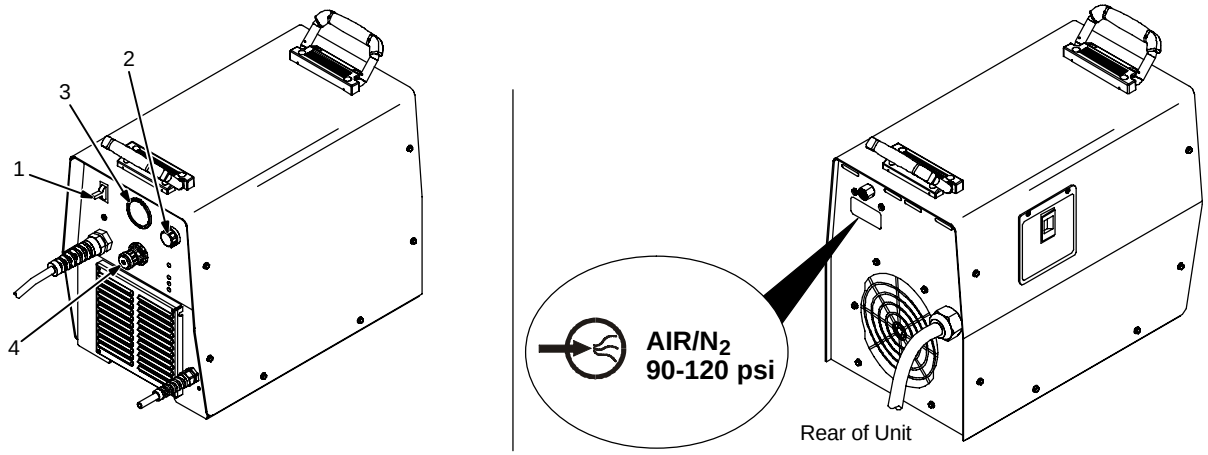
6 Outer Shell

7 Cord Grip

Strip cord jacket back enough to separate conductors.
Strip conductors enough to make good contact with plug terminals. Make plug connections and reinstall outer shell and cord grip. Tighten assembly screws onto shell. Do not overtighten.

Ref. 801 305-A / 801 611

4-12. Setting Gas/Air Pressure



Ref. 803 219 / 803 221

Setting Gas/Air Pressure

Place Output Control in Gas/Air Set Position
Power Switch On
Set Controls → Requires 90−120 PSI Supply (621−827 kPa) Turn On Gas/Air Supply → Set To **75 PSI** (517 kPa) For Cutting Or **55 PSI** (379 kPa) For Gouging Adjust Pressure On Unit → Select Desired Amperage To Begin Cutting

1 Power Switch

Place power switch in On position

2 Output Control

Place output control in Gas/Air position.

3 Pressure Gauge

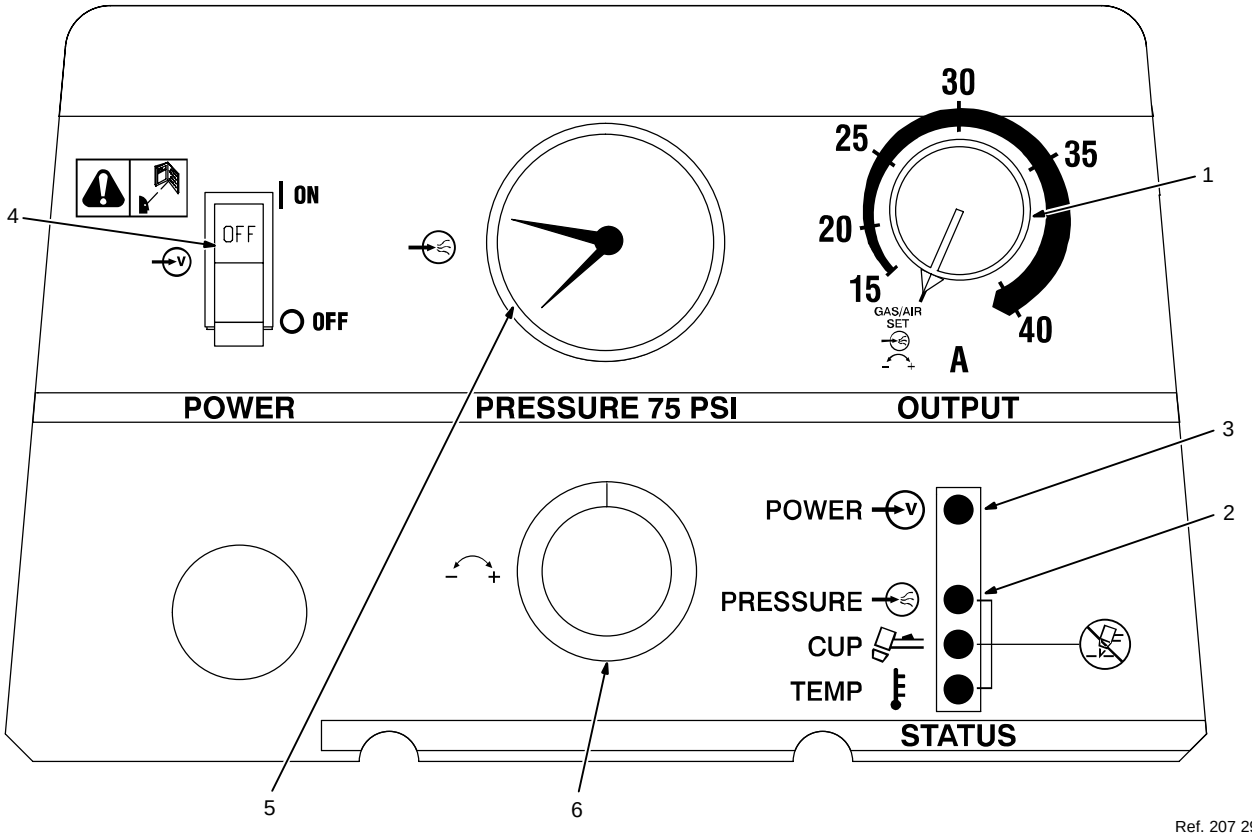
4 Gas/Air Pressure Adjustment Knob

Adjust pressure to 75 psi (517 kPa) on pressure gauge by pulling and turning knob. Push knob in to lock setting.

Select desired cutting output with Output Control.

SECTION 5 − OPERATION

5-1. Controls



Ref. 207 299

1 Output Control

Use control to set cutting output.

Place control in Gas/Air Set position to safely adjust gas/air pressure. Only gas/air circuit is activated.

2 Status Lights (See Section 6-2)

3 Power Light

4 Power Switch

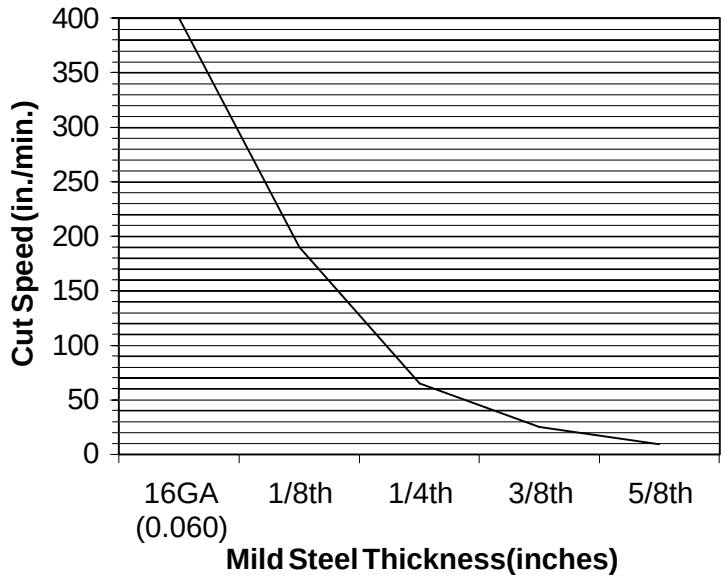
☞ *The fan will normally run for approximately 5 seconds after power switch is placed in the Off position.*

5 Pressure Gauge

6 Pressure Adjustment Knob

☞ *At ambient temperatures below −5° C (23° F), readjustment of gas/air pressure regulator may be necessary (see Section 4-12).*
Use only clean, dry air with 90 to 120 psi (621 to 827 kPa) pressure. Prevent moisture from entering air supply at extreme cold temperatures.

5-2. Cutting Speed

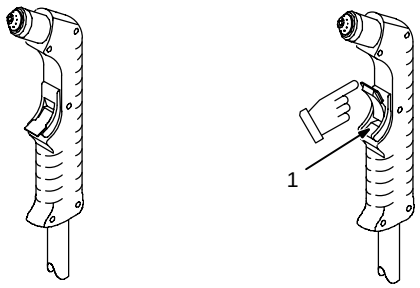


The cutting speed curve shows the recommended maximum cutting speed capabilities of the power source and torch for mild steel of various thickness.

The best cut quality is achieved by cutting near the chart line. Cutting below the line (too slow) will result in excess dross. Cutting above the line (too fast) will cause blowback and lack of penetration.

5-3. Trigger Safety Lock

1 Trigger

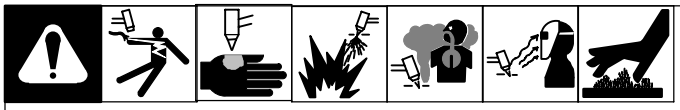


Trigger Locked

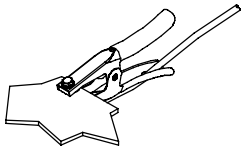
Trigger Unlocked

801 397-A

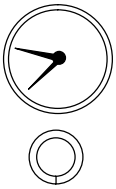
5-4. Plasma Cutting System Practices



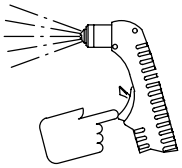
The pilot arc starts immediately when trigger is pressed.



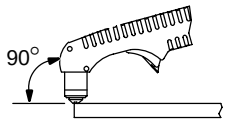
Always connect work clamp to a clean, paint-free location on workpiece, as close to cutting area as possible.



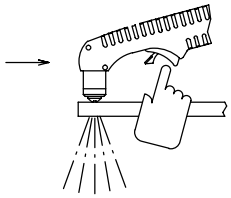
☞ *Set correct air pressure for process:*
***75 PSI** (517 kPa) for cutting,*
***55 PSI** (379 kPa) for gouging.*



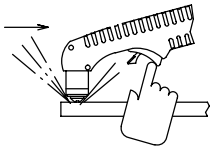
DO NOT start pilot arc without cutting or gouging as this shortens the service life of the nozzle and electrode.



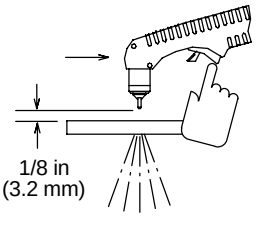
Maintain approximately a 90° angle to the workpiece surface for proper cutting results.



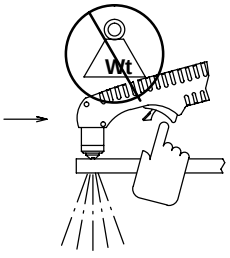
Sparks should pass through the workpiece and out the bottom when cutting.



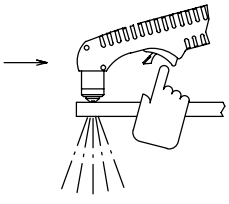
If sparks flare back from surface, this usually is an indication that either travel speed is too fast or amperage is set too low.



When doing **extended (non-shielded)** cutting, maintain approximately 1/8 in standoff between electrode and surface.



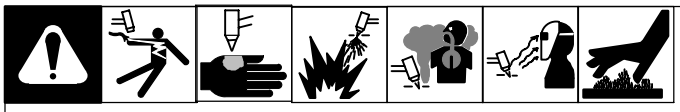
DO NOT put pressure on shield when **drag cutting**; instead, slide shield along the surface for proper cutting results.

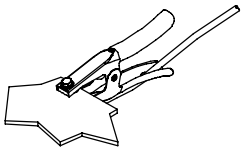


Pulling rather than pushing the torch makes cutting easier. Use a proper guide or template for accurate cutting operations.

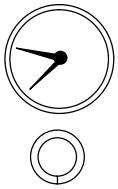
Ref. 803 640-A / 801 400-B / Ref. 802 878

5-5. Sequence Of Cutting Operation



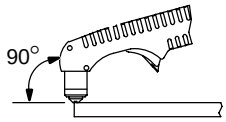


Connect work clamp to a clean, paint-free location on workpiece, as close to cutting area as possible.

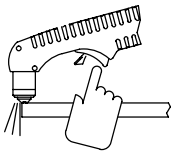


☞ *Set air pressure to **75 PSI** (517 kPa) for cutting.*

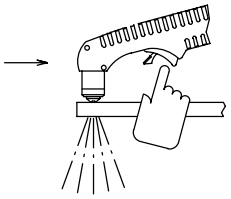
The pilot arc starts immediately when trigger is pressed.



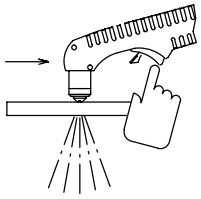
For standard (shielded) cutting, place drag shield on edge of metal. For extended (non-shielded) cutting, use 1/8 in (3.2 mm) standoff distance (dragging tip will reduce tip life).



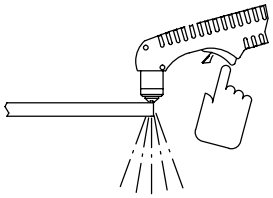
Raise trigger lock and press trigger. Pilot arc starts.



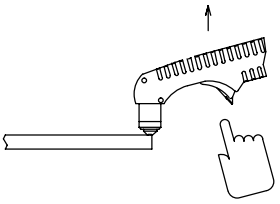
After cutting arc starts, slowly start moving torch across metal.



Adjust torch speed so sparks go thru metal and out bottom of cut.



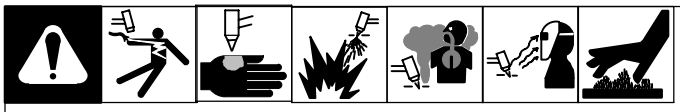
Pause briefly at end of cut before releasing trigger.

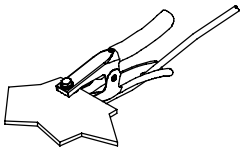


Postflow continues for approx. 20 seconds after releasing trigger; cutting arc can be instantly restarted during postflow by raising trigger lock and pressing trigger.

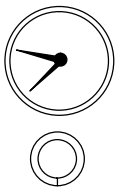
Ref. 803 640-A / 801 400-B

5-6. Sequence Of Gouging Operation



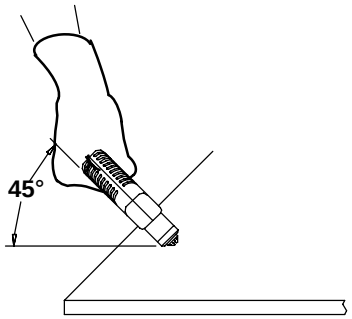


Connect work clamp to a clean, paint-free location on workpiece, as close to cutting area as possible.

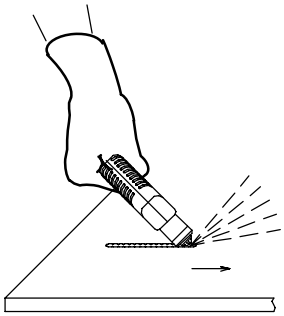


☞ *Set air pressure to **55 PSI** (379 kPa) for gouging.*

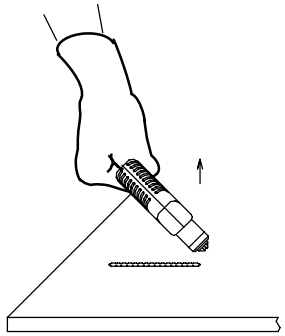
The pilot arc starts immediately when trigger is pressed.



Hold torch at approximately 45° angle to workpiece.



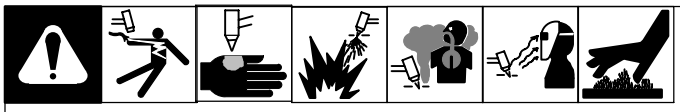
Raise trigger lock and press trigger. Pilot arc starts. Move tip to within approximately 3/16 in (4.8 mm). Start gouging across workpiece surface. Maintain approximately a 45° angle to surface.



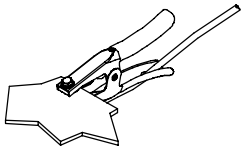
Release trigger. Postflow continues for approx. 20 seconds after releasing trigger; arc can be instantly restarted during postflow by raising trigger lock and pressing trigger.

Ref. 803 640-A / 801 400-B

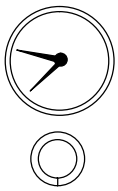
5-7. Sequence Of Piercing Operation



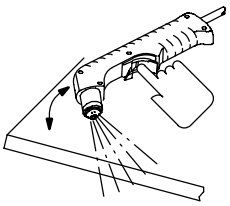
The pilot arc starts immediately when trigger is pressed.



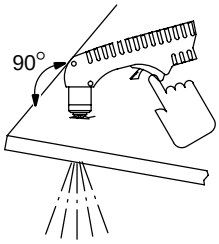
Connect work clamp to a clean, paint-free location on workpiece, as close to cutting area as possible.



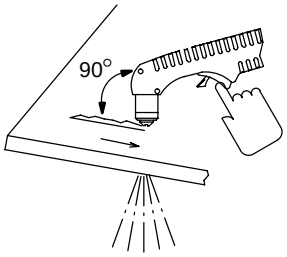
☞ *Set air pressure to **75 PSI** (517 kPa) for cutting.*



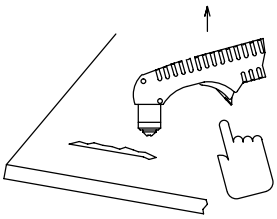
Hold torch at an angle to the workpiece. Raise trigger lock and press trigger. Pilot arc starts.



Rotate torch to upright position approximately 90° to surface. When arc has pierced through workpiece, start cutting.



Maintain approximately 90° torch position to surface, and continue cutting.

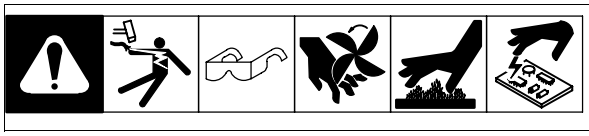


Release trigger. Postflow continues for approx. 20 seconds after releasing trigger; arc can be instantly restarted during postflow by raising trigger lock and pressing trigger.

Ref. 803 640-A / 801 400-B

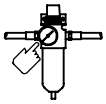
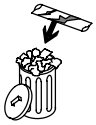
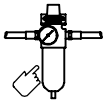
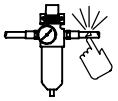
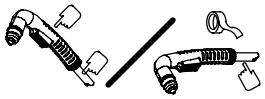
SECTION 6 − MAINTENANCE & TROUBLESHOOTING

6-1. Routine Maintenance

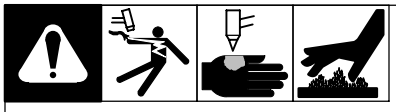


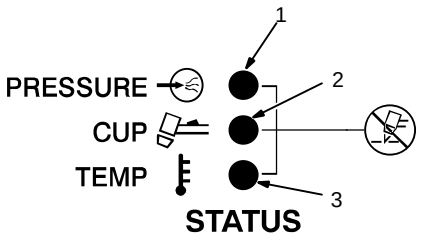
▲ **Disconnect power before maintaining.**

☞ *Maintain more often during severe conditions.*

	✓ = Check ◇ = Change ◒ = Clean ☆ = Replace * To be done by Factory Authorized Service Agent				Reference
Each Use	 ✓ Torch Tip, Electrode, And Shield Cup	 ✓ Gas/Air Pressure			
Every Week	 ✓ Shield Cup Shutdown System				
Every 3 Months	 ☆ Damaged Or Unreadable Labels	 ☆ Cracked Parts	 ◒ Air Filter/Regulator Assembly Filter	 ✓ Gas/Air Hose	
	 ✓ ☆ Torch Body, Cable				
Every 6 Months	 ◒ Inside Unit				

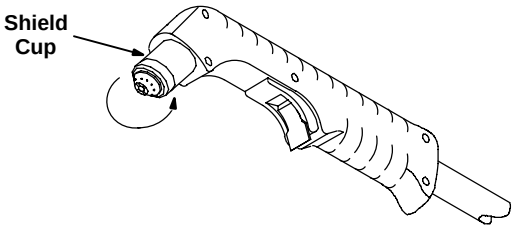
6-2. Overload Protection: Status Lights & Checking Shield Cup Shutdown System





Checking Torch Shield Cup Shutdown System

☞ *Power must be reset whenever the cup shutdown system is activated.* ***Always turn Off power when changing or checking consumables. Do NOT overtighten torch shield cup. Gently finger tighten cup onto torch.***



If certain problems occur, a status light comes on, and output stops.

1 Pressure Light

Lights if gas/air pressure is below 40 PSI (276 kPa).

Turn power Off, and check for proper gas/air pressure (see Section 4-12).

A flashing Pressure light indicates that gas/air system may be set too low, faulty, leaking or has a flow restriction (see Section 6-5).

2 Cup Light

Lights if shield cup is loose/off.

Turn Power On and loosen shield cup. If shutdown system works properly, Cup light comes on. If not, turn power Off and have a factory authorized service agent check unit.

If system works properly, retighten cup and reset power.

Turn power Off, and check shield cup connection (see torch Owner's Manual). Power must be reset whenever the cup shutdown is activated.

A flashing Cup light indicates that the torch consumables are stuck or worn and should be inspected and/or replaced (see Section 6-3).

Check shield cup shutdown system once a week.

3 Temperature Light

Lights if power source overheats or when ambient temperature is below −20° C (−4° F) (see Section 4-3).

Fan-On-Demand

Cooling fan will operate during the following conditions:

a Unit is in an OVERTEMP condition. TEMP indicator light will illuminate and fan will run until unit cools down.

b Unit gets hot during idle, either from a change in ambient air temperature or after long periods of cutting.

c Unit is in cutting or postflow mode.

Ref. 200 808 / Ref. 801 300-A

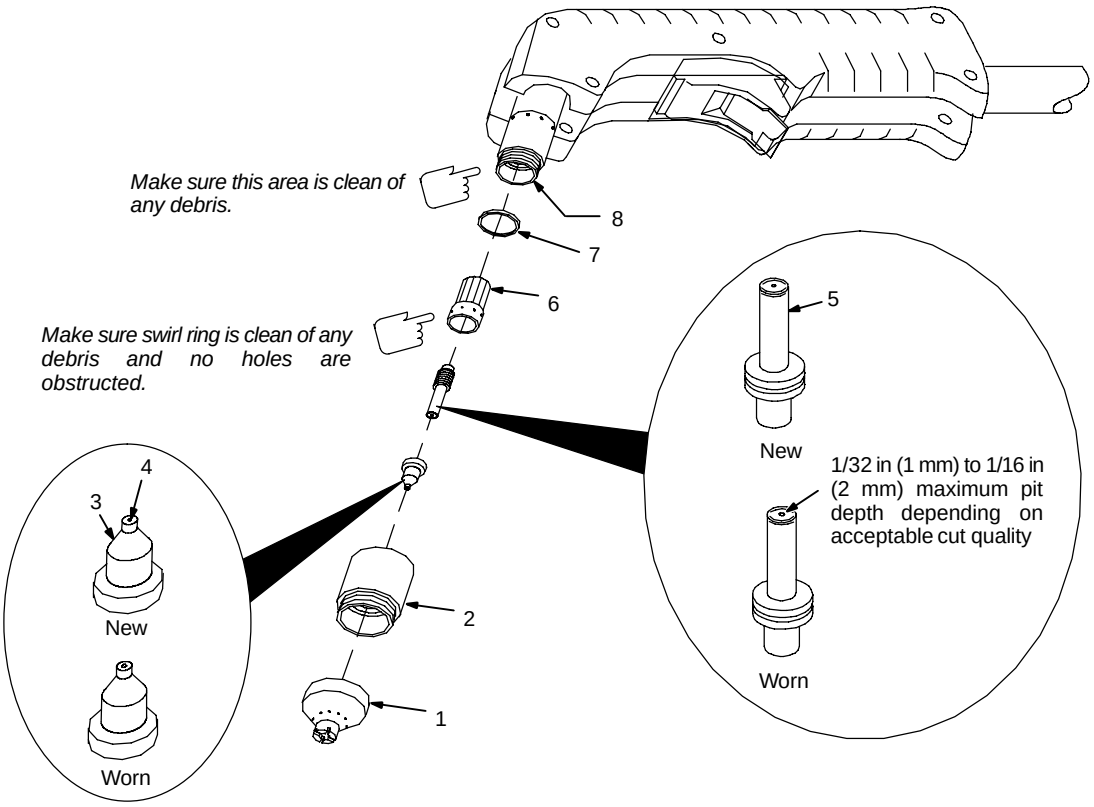
6-3. Checking/Replacing Retaining Cup, Tip, And Electrode

Overtightening will strip threads. Do not overtighten retaining cup during assembly. Do not cross-thread parts causing stripping. Use care during torch assembly and parts replacement.

Inspect shield cup, tip, and electrode for wear before cutting or whenever cutting speed has been significantly reduced. Do not operate torch without a tip or electrode in place. Be sure to use genuine replacement parts.

A good practice is to replace both the tip and electrode at the same time.

Turn Off power source before checking torch parts.



Ref. 803 224

Turn Off power source.

1 Drag Shield

2 Retaining Cup

Remove retaining cup. Check retaining cup for cracks, and replace if necessary.

3 Tip

4 Opening

Remove tip. Check tip, and replace if opening is deformed or 50% oversize. If inside of tip is not clean and bright, clean with steel wool. Be sure to remove any pieces of steel wool afterwards.

5 Electrode

Check electrode. If center has a pit more than a 1/32 in (0.8 mm) deep, remove and replace electrode.

6 Swirl Ring

Remove swirl ring. Check ring, and replace if side holes are plugged.

7 O-Ring

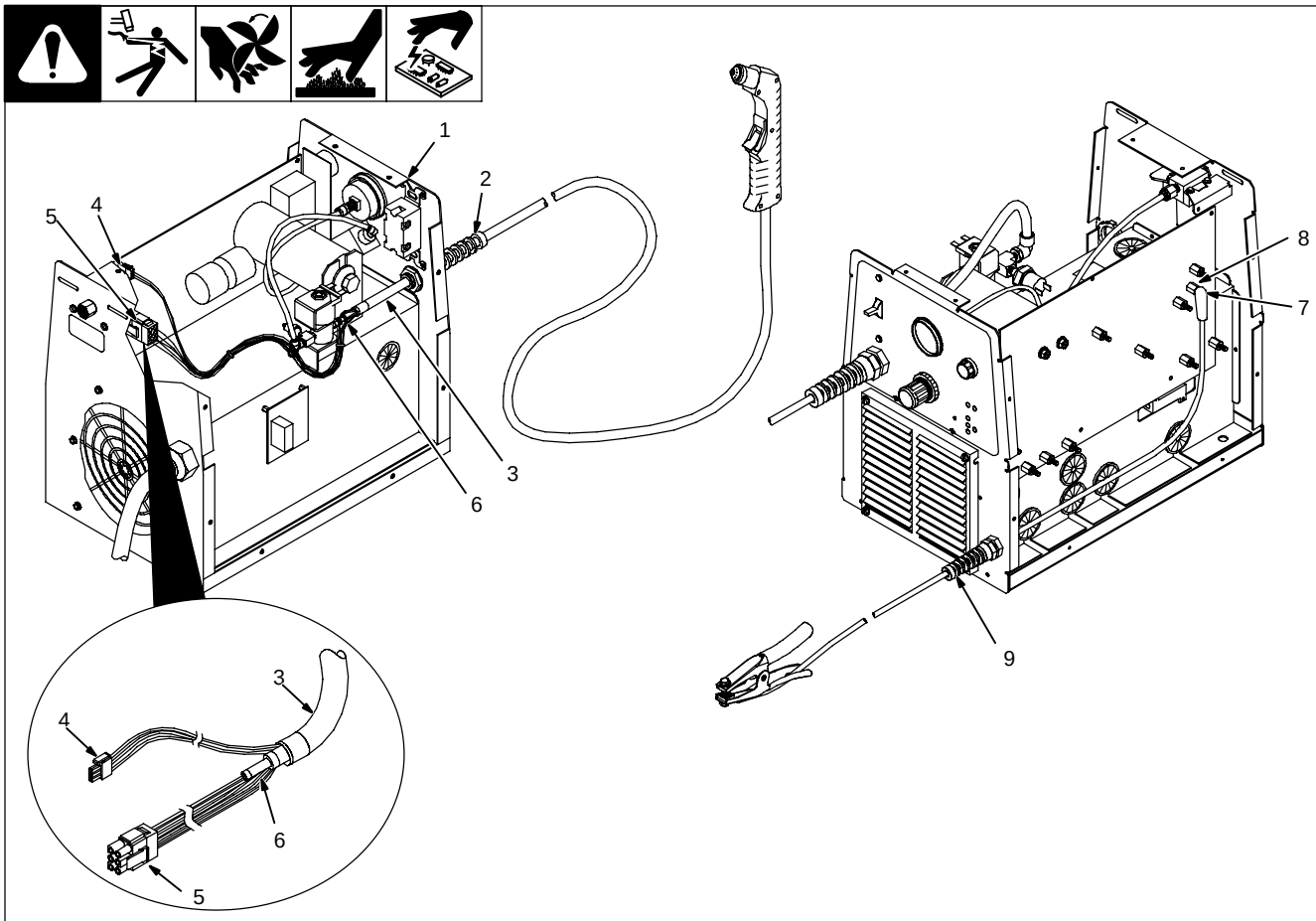
Check O-rings on torch. If needed, coat with thin film of silicone lubricant (part no. 169 231). Replace if damaged.

8 Plunger Area

Check this area for any debris or foreign material. Clean out if necessary.

Carefully reassemble parts in reverse order.

6-4. Torch And Work Cable Replacement



▲ **Turn Off power source, and disconnect input power.**

If torch or work cable needs to be removed or replaced, proceed as follows:

1 Power Source

Remove wrapper.

Torch Replacement

2 Strain Relief

3 Torch Cable

Loosen outer strain relief pigtail so that torch cable can slide freely.

4 Plug PLG1/Receptacle RC1

Disconnect PLG1 from receptacle RC1 on Control board PC1.

5 Plug PLG11/Receptacle RC11

Disconnect PLG11 from receptacle RC11 on Control board PC1.

6 Air Line Connector

Push orange fitting inward toward air solenoid while pulling connector out of fitting.

Remove nut, located inside of unit, from back of strain relief.

Slide torch cable, connector, and plugs through nut and out of unit. Retain nut for use on replacement strain relief.

Insert replacement cable with strain relief through opening where old cable and strain relief were removed. Slide strain relief nut over plugs, connector, and cable. Install nut onto strain relief, but do not tighten.

Insert air line connector into solenoid fitting.

Connect PLG1 to RC1 on Control board PC1.

Connect PLG11 to RC11 on Control board PC1.

Tighten strain relief nut.

Tighten strain relief around cable.

Work Cable Replacement

7 Rubber Boot

8 Work Cable Ring Terminal

Slide rubber boot away from ring terminal connection on Control board PC1. Remove hardware securing ring terminal to PC1.

9 Strain Relief

Remove nut, located inside of unit, from back of strain relief.

Slide work cable through nut and out of unit. Retain nut for use on replacement strain relief.

Slide rubber boot over ring terminal and off of work cable. Retain rubber boot for use on replacement work cable.

☞ *Be sure to allow some work cable slack inside the unit.*

Insert replacement cable with strain relief through opening where old cable and strain relief were removed. Slide strain relief nut over ring terminal and cable. Install nut onto strain relief, but do not tighten.

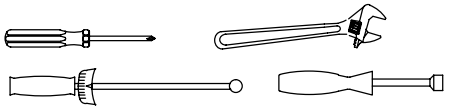
Route cable along bottom of unit and up to PC1.

Slide rubber boot over ring terminal and onto work clamp lead. Connect work cable ring terminal to terminal labeled WORK on circuit board PC1. Torque to 35 in lb (4 N·m). Slide boot over connection.

Tighten strain relief nut.

Tighten strain relief around cable.

Tools Needed:



5/16, 3/8 in

803 386 / 803 385-A

6-5. Troubleshooting Power Source

Is Power switch S1 in the On position?
- No → Place Power switch in the On position. (see Section 5-1).
- Yes ↓

Is Power light flashing?
- Yes → Reset Power switch S1.
- No ↓

Is Cup Status light On or flashing?
- Yes → Check torch consumables/ cup. Reset Power switch S1. *Check torch connections. *Check Control board PC1.
- No ↓

Is Temp Status light On?
- Yes → If unit is overheated, wait while fan cools down unit temperature.
- No ↓

Is Pressure Status light On or flashing?
- Yes → Turn Output control fully counterclockwise (see Section 4-12). Check for gas/air flow at torch. *Check Control board PC1, pressure switch, air filter, valve AS1, and air supply connection to unit and torch.
- No ↓

Does pilot arc ignite?
- No → Press torch trigger and check if pilot arc ignites. Check torch consumables. *Check torch connections, air filter, pressure switch S3, valve AS1, air supply connection to unit, torch, and PC1.
- Yes ↓

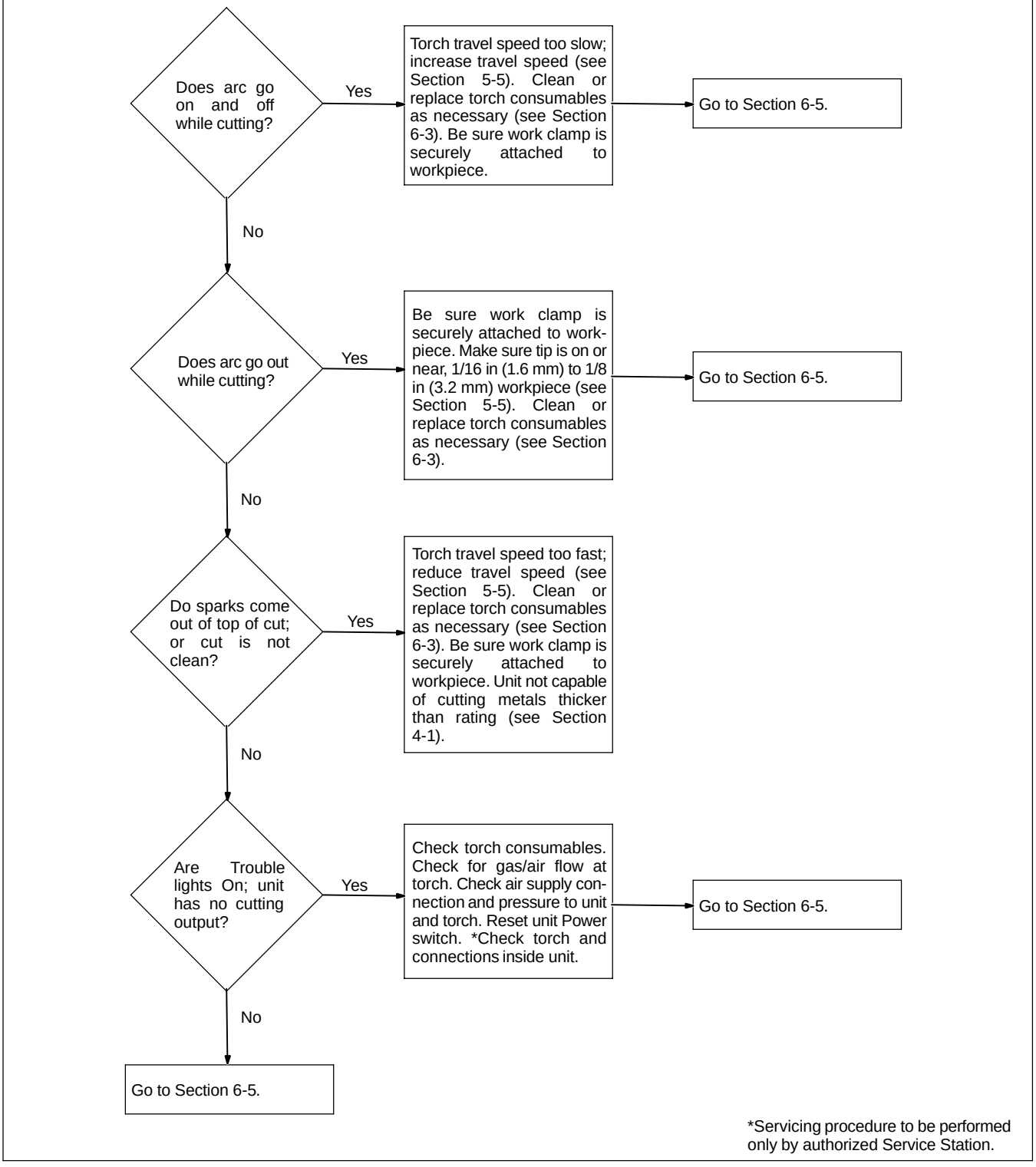
Does pilot arc transfer to workpiece?
- No → Place torch near workpiece and check if pilot arc “jumps” or transfers to workpiece. Check work clamp connection. *Check Control board PC1 and connections, and torch and its connections.
- Yes ↓

* Check all connections, Check main transformer T1, Check boost inductor L1 and output inductor L2. Return to beginning of chart.

NOTE: The fan will normally run for approximately 5 seconds after power switch is placed in the Off position (see Section 5-1).

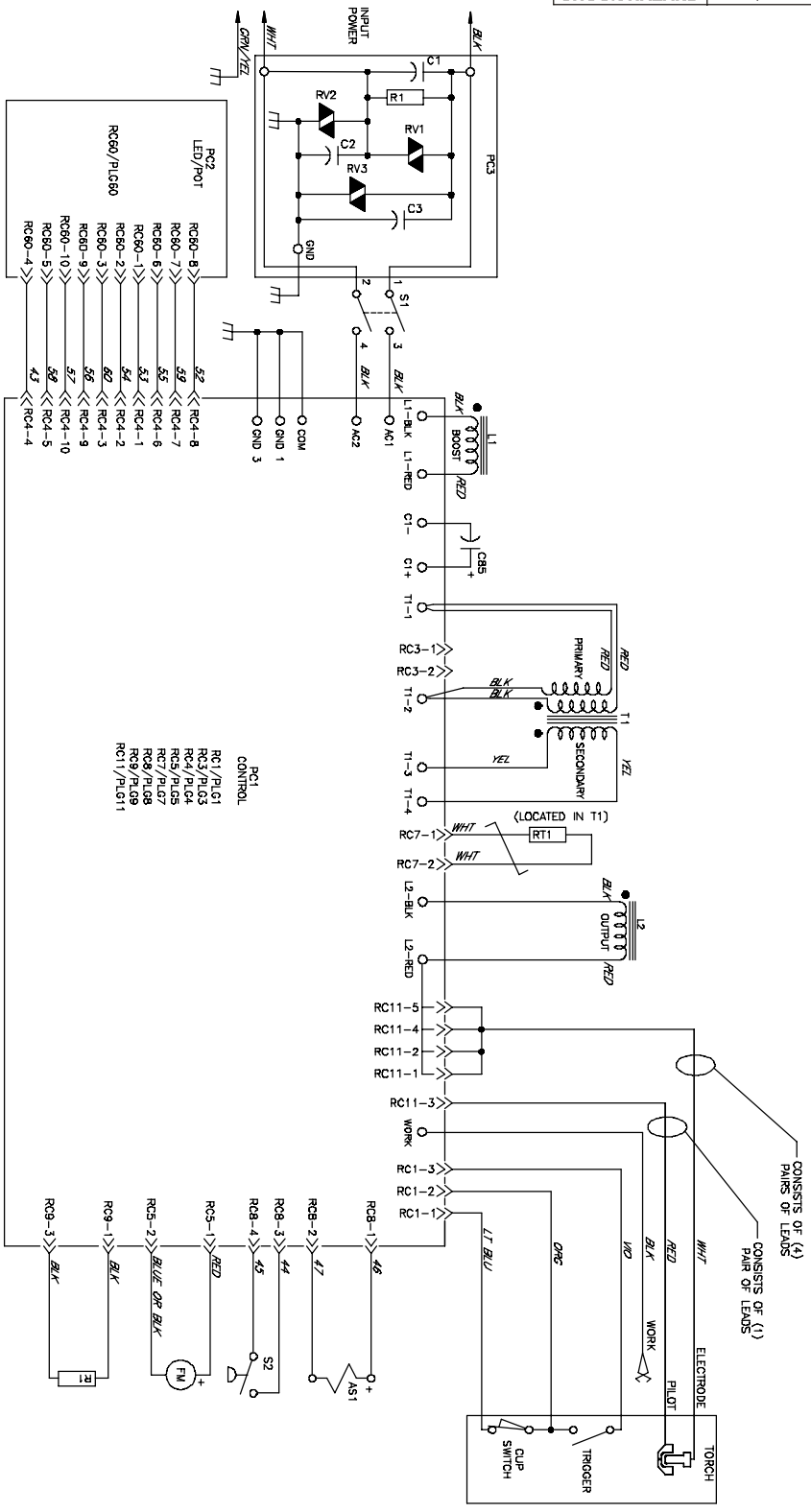
*Servicing procedure to be performed only by authorized Service Station.

6-6. Troubleshooting Torch



SECTION 7 − ELECTRICAL DIAGRAM

⚠ WARNING	• Do not touch live electrical parts. • Disconnect input power or stop engine before servicing. • Do not operate with covers removed. • Have only qualified persons install, use, or service this unit.
ELECTRIC SHOCK HAZARD	



212 926-A

Figure 7-1. Circuit Diagram

SECTION 8 − PARTS LIST

8-1. Recommended Spare Parts

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Recommended Spare Parts	
		213308	. . COVER ASSY (INCLUDING)	1
		207 686	. . . . LABEL, ICE 40C CONSUMABLES	1
		227877	. . FILTER,AIR ELEMENT	1
		216447	. . CABLE,WORK 25 FT 6 GA W/CLAMP STRAIN RLF & TERM	1
		217891	. . CABLE,WORK 50 FT 6 GA W/CLAMP STRAIN RLF & TERM	1
		213619	. . CLAMP,WORK 300A STL CHROME PLD W/COPPER CONTACTS	1
		213620	. . CONTACT TIP,WORK CLAMP 300AMP COPPER	2
		195110	. . ICE−40C 25FT HAND HELD REPLACEMENT TORCH OR	
		195111	. . ICE−40C 50FT HAND HELD REPLACEMENT TORCH	1

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

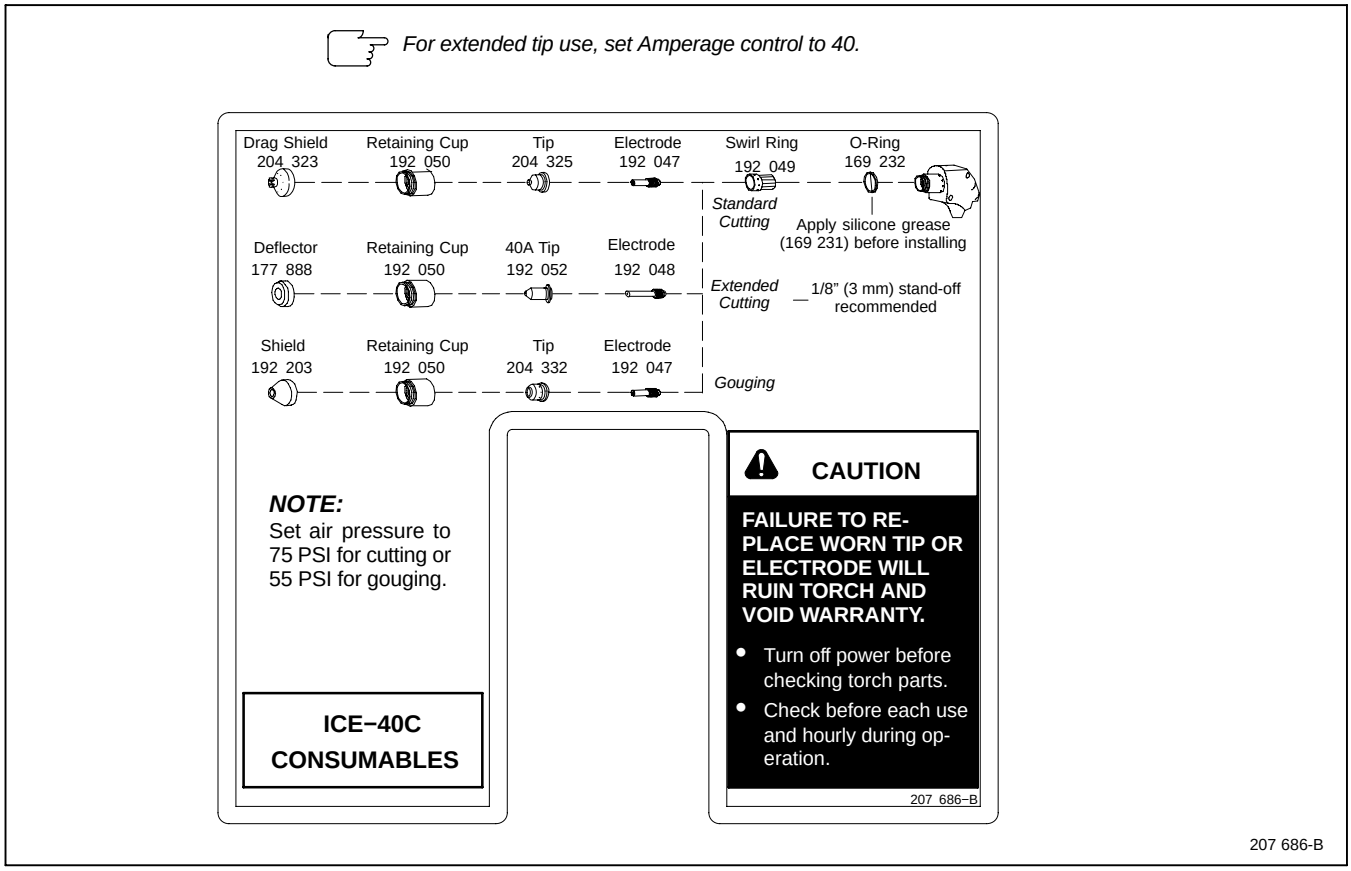
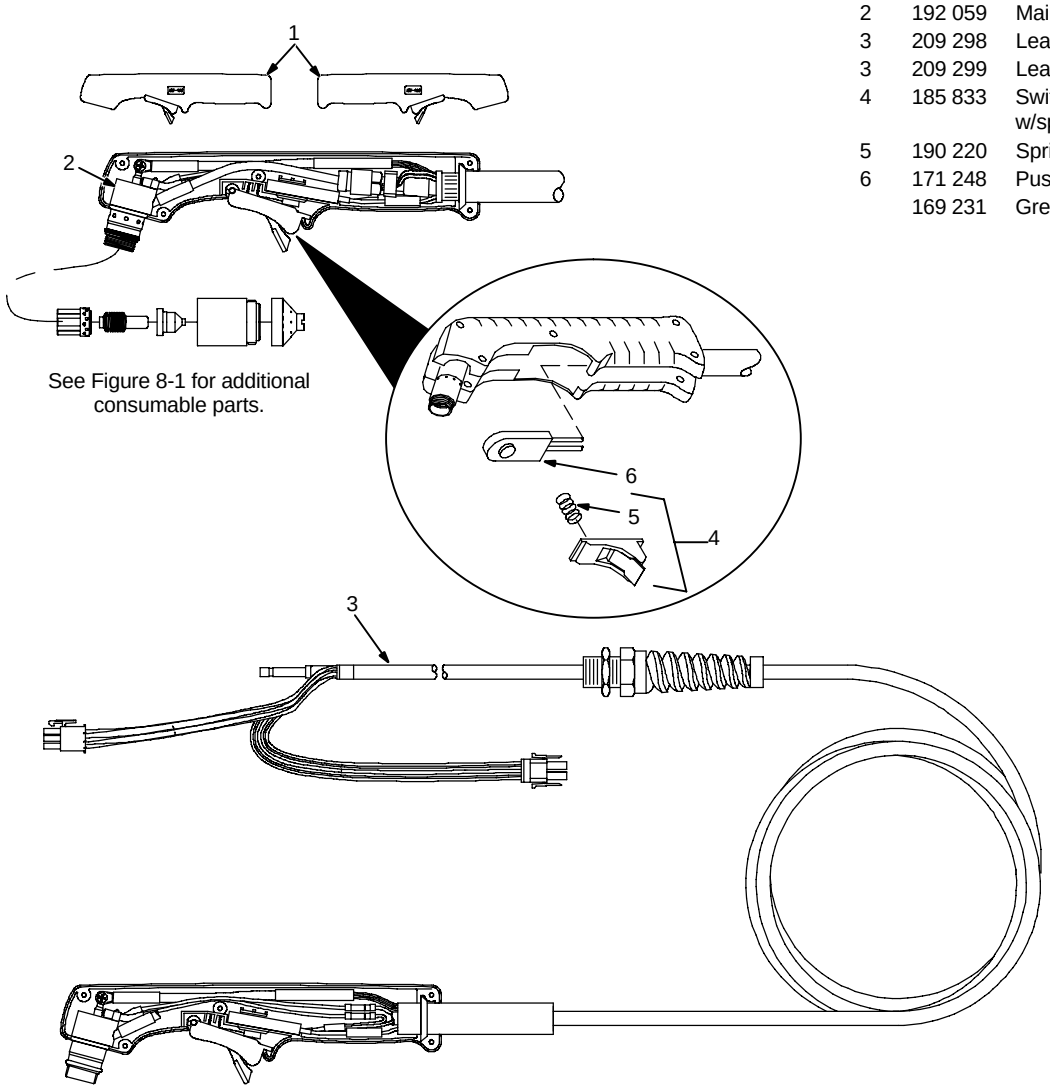


Figure 8-1. Consumable Parts For ICE-40C

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

NOTE: *The ICE-40C torch is specifically for use only with this plasma cutting unit.*

Item No.	Part No.	Description
	195 110	**ICE-40C 25ft Torch**
	195 111	**ICE-40C 50ft Torch**
1	183 427	Handle Assy, complete (1)
2	192 059	Main Body (1)
3	209 298	Leads, 25ft (1)
3	209 299	Leads, 50ft (1)
4	185 833	Switch Assembly w/spring (1)
5	190 220	Spring, trigger assembly
6	171 248	Push Button Switch (1)
	169 231	Grease, silicone (1)



Ref. 195 092 / Ref. 803 224

Figure 8-2. Torch, ICE-40C

NOTE ☞	*A complete Parts List is available on-line at www.MillerWelds.com*

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

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Call
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Your distributor also gives you ...

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You always get the fast, reliable response you need. Most replacement parts can be in your hands in 24 hours.

Support
Need fast answers to the tough welding questions? Contact your distributor. The expertise of the distributor and Miller is there to help you, every step of the way.

Miller

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(Equipment with a serial number preface of “LH” or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY − Subject to the terms and conditions below, Miller Electric Mfg. Co., Appleton, Wisconsin, warrants to its original retail purchaser that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the delivery date of the equipment to the original end-user purchaser, and not to exceed one year after the equipment is shipped to a North American distributor or eighteen months after the equipment is shipped to an International distributor.

1. 5 Years Parts — 3 Years Labor
   * Original main power rectifiers
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Process Controllers
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Sources (Unless Otherwise Stated)
   * Water Coolant Systems (Integrated)
   * Intellitig
   * Engine Driven Welding Generators **(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor Unless Specified
   * Motor Driven Guns (w/exception of Spoolmate Spoolguns)
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources, Coolers, and Electronic Controls/Recorders
   * Water Coolant Systems (Non-Integrated)
   * Flowgauge and Flowmeter Regulators (No Labor)
   * HF Units
   * Grids
   * Spot Welders
   * Load Banks
   * Arc Stud Power Sources & Arc Stud Guns
   * Racks
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
   * Bernard-Branded Mig Guns (No Labor)
   * Weldcraft-Branded TIG Torches (No Labor)
   * Subarc Wire Drive Assemblies
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches and Subarc (SAW) Guns
   * Induction Heating Coils and Blankets, Cables, and Non-Electronic Controls
   * APT & SAF Model Plasma Cutting Torches
   * Remote Controls
   * Accessory (Kits)
   * Replacement Parts (No labor)
   * Spoolmate Spoolguns
   * Canvas Covers

Miller’s True Blue® Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear. (Exception: brushes, slip rings, and relays are covered on Bobcat, Trailblazer, and Legend models.)**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer’s warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

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In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller’s option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer’s risk and expense. Miller’s option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

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Owner's Record

Please complete and retain with your personal records.

Model Name Serial/Style Number

Purchase Date (Date which equipment was delivered to original customer.)

Distributor

Address

City

State Zip

For Service

Contact a DISTRIBUTOR or SERVICE AGENCY near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:	Welding Supplies and Consumables Options and Accessories Personal Safety Equipment Service and Repair Replacement Parts Training (Schools, Videos, Books) Technical Manuals (Servicing Information and Parts) Circuit Diagrams Welding Process Handbooks To locate a Distributor or Service Agency visit www.millerwelds.com or call 1-800-4-A-Miller
Contact the Delivering Carrier to:	File a claim for loss or damage during shipment. For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.

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